The OIL AND GAS JOURNAL

FEBRUARY 27, 1961 PUBLISHED WEEK

Exclusive survey indicates

BRIGHT FUTURE FOR PLASTIC PIPE

p. 82

RESIDUAL-FUEL-OIL IMPORTS:

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East Coast fuel-oil prices aren't too high
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How Phillips looks at gasoline pricing
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Gulf Coast drillers whip wall sticking
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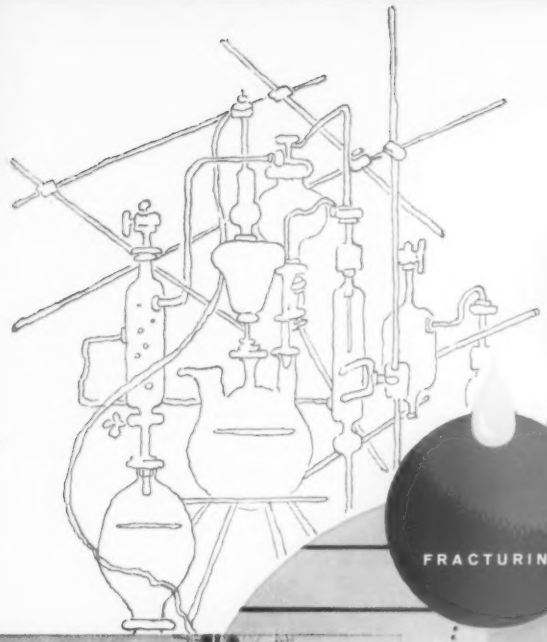

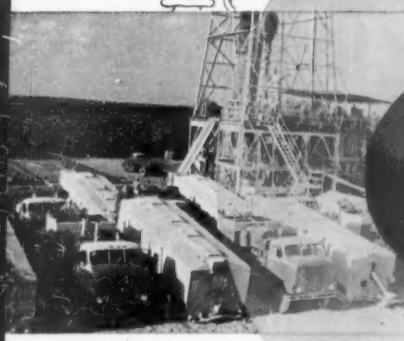

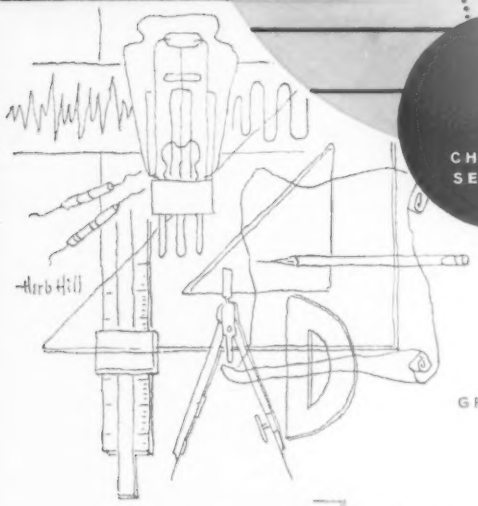

TESTING

FRACTURING

CEMENTING

CHEMICAL SERVICES

SPECIAL PRODUCTS & SERVICES

GROUTING

WATER WELL

THE WORLD OF HALLIBURTON

Halliburton's dedication to complete service to the oil industry has resulted in the accomplishment of leadership in the four major areas of oil well services — testing, fracturing, cementing, and chemical services. Each of these departments within the Halliburton organization is supported by its own research and development teams, manufacturing units, and field service experts. Each has been responsible for bringing revolutionary developments to its own segment of the industry, making possible the evolvement to today's modern drilling and producing practices.

Recently another entity was added to provide other industries with special products and services that, where applicable, will bring new technological advancements for the benefit of diversified interests.

The world of Halliburton has as its axis—service. It will continue to devote its manpower and energies to the service of the oil and gas industry as its main purpose while always being alert to the requirements of others.

Halliburton

COMPANY • DUNCAN, OKLAHOMA

OIL AND GAS JOURNAL
Vol. 59, No. 9

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TECHNOLOGY—OPERATION

Refining-Processing

SPECIAL SECTION: Plastic Pipe in the Oil Industry **82**

By Hugh S. Pylant

This first survey of plastic-pipe usage in oil and gas fields shows that oil companies installed about 25% more in 1960 than in 1959 and that they plan to use an equally large quantity during 1961.

Silicones Combat Residuum Foaming **85**

By P. M. Waddill, D. W. Gagle, J. A. Price, and D. M. Little

A concentration of 0.2 p.p.m. silicone antifoam agent protects residuum storage tanks from foaming. If oil does boil over it will have nearly zero foaming tendency. Silicone antifoam agents in concentrations from 0.2 to 1,000 p.p.m. have no appreciable effect on the properties of asphalt.

Expansion Traps Provide Low-Cost Temperature Control **112**

By H. L. Johnson

Where loads and temperatures are reasonably uniform an expansion steam trap can be used not only to remove condensate and air, but also to regulate temperature. And it can do a reliable job at low cost.

Pipelining

Single Submerged Lines are Used for Missouri Crossings **88**

By Paul Reed

Natural Gas Pipeline Co. of America recently installed the single-line crossings in the Missouri River near Plattsmouth, Neb. Reliance on a single well-constructed river crossing for each overland line is somewhat new in industry practice.

Pipeline Construction Reports **114**

Drilling-Production

How to Choose the Right Log **90**

By D. J. Cregeen

Not every log will work in a particular area. This has been the experience of operators in Southeast Arabia, but they found a way to choose those that give the best results. Here is a summary of the methods they used.

Active Water-Flood Projects in the U. S. **95**

By W. B. Bleakley

Here is a list of publications, pamphlets, brochures, etc., that will tell you where the active floods are, how many wells, production and injection rates, and lots of other things about water-flood projects in the U. S.

Gulf Coast Drillers Whip the Wall-Sticking Problem **100**

By Ed McGhee

They're using lighter mud weights; employing stabilizers and centralizers, even in straight-hole areas; running grooved drill collars; keeping the drill string in continuous motion; putting wetting agents in the mud; and keeping water loss lower and mud filter cakes thinner.

Reservoir Engineering—33 ..... **104**

By E. T. Guerrero

How to find original oil in place by material balance above the bubble point.

General

Economics of a Sound Safety Program—4. ..... **109**

By James H. Herbert

This careful outline will show how to analyze a safety program.

the OIL AND GAS JOURNAL Newsletter

Tulsa, Okla.
Feb. 27, 1961

The oil industry is under the gun on pricing again:

Good defense can be made for the fuel-oil price increases. They are higher than a year ago, but it so happens that last year's fuel-oil prices were unusually low, actually the lowest in 10 years if figured on a constant dollar (p. 56)*.

The January-February average barge price in New York harbor is 10.43 cents a gallon. It has been higher in 7 of the last 10 years. This year's price increases were needed to attract supplies from the Gulf and Mid-Continent to the East Coast, cover higher tanker rates and pay greater distribution costs.

Even retail prices don't appear out of line. Highest posted prices in New York City for No. 2 this year have been 15.9 cents. Top price in 1960 was 14.9 cents, but it was 15.6 in 1959 and 15.1 in 1958 and 16 cents in 1957.

Fuel bills have been high—no arguing it. The reason hasn't been general price gouging by oil marketers but the heavy volumes of oil needed to keep homes warm during extremely cold weather.

▼ ▼ ▼

Hearing by Interior Secretary Udall on a new policy for importing residual oil has some oil leaders doubting the wisdom of controls over this material (p. 55).

Coal interests form bulwark of support for residual quotas. Domestic refiners have been making less and less resid—they are now cracking it into more profitable products.

But the controls arouse ire of consumers and politicians who are supersensitive on oil prices.

New trust-buster is Lee Loevinger, 47-year-old Minnesota judge who will succeed Robert Bicks.

Loevinger ranks antitrust enforcement as more important to the nation than anything except survival in face of nuclear weapons.

He's a key man for oil to know. He'll handle antitrust aspects of oil-import program; impact of government procurement on small business and competition; and antitrust activity against oil and gas companies; and will keep eye on work of Interstate Oil Compact.

▼ ▼ ▼

Rotary rig activity picked up some last week.

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*Refers to article in this issue giving more details. When no page is given, the item is a Newsletter exclusive.

Total of 1,553 rigs was at work for the period, a gain of 74 over the week before. Drilling has had a very slow start this year and will have to pick up sharply if the industry's planned program of 46,964 wells is completed.

One word of caution: Comparison with last year's drilling is tricky. It was an unusual year—good until June, subnormal through rest of year. Better comparison is with 1955-59 average.

Another barometer—domestic oil production—is lagging.

Production first 7 weeks of 1961 has averaged 73,000 bbl. daily below last year's average for same period. The output has been 7,160,000 bbl. daily compared with 7,233,000 last year.

Domestic demand faces a seasonal drop of 1,000,000 bbl. daily in next 3 months, IPAA statisticians report.

Market for crude oil in March-May period will average 7,000,000 bbl. daily, 200,000 bbl. below February production and 220,000 bbl. daily less than same months last year.

IPAA figures supply needed in next 3 months will be 9,775,000 bbl. daily to be provided by 1,800,000 bbl. daily of imports, 975,000 bbl. daily of natural-gas liquids, 7,000,000 bbl. daily of domestic crude.

Cut in refinery operations is vital during the period. The IPAA recommendation: Average runs of 7,900,000 bbl. daily for next 3 months, down sharply from 8,400,000 bbl. daily in January and 8,125,000 bbl. daily average for last 3 months.

Crude stocks are doing pretty well.

They dropped 990,000 bbl. in the latest week and now total only 232,231,000 bbl., about the same level that prevailed on October 1.

But stocks will start to climb in March unless there is colder weather. The 10-day production schedule for Texas will add another 200,000 bbl. daily to supply at a time when runs should be easing up.

▼ ▼ ▼

A 2-year lull may be ending for exploratory drilling in the Gulf off the lower Texas coast.

Tennessee Gas Transmission plans a 12,600-ft. wildcat 8 miles out from Kleberg County in Large State Tract 860. Nearest field is Sprint about a mile offshore whose only well is shut-in gasser.

Only other drilling anywhere off the Texas coast now is a lone Shell wildcat off Galveston County in upper coastal waters.

New depth record is likely in northern New Mexico.

El Paso Natural will drill a 16,000-ft. wildcat in eastern part of San Juan basin in Rio Arriba County. If it goes this deep, well will be first to go below Cretaceous in the area and will top old record by 3,000 ft.

Study of Rocky Mountain drilling last year shows a composite average of 21.4 bbl. of oil found per foot of hole. Average cost

per barrel was $2.19 without credit for gas or liquids.

▼ ▼ ▼

Some Louisiana producers are taking advantage of the state's higher allowables for widely spaced wells.

An 80-acre spacing pattern will be recognized in Opelousas field starting March 1. Allowables will be about 50% greater than those under the old formula.

Use of plastic pipe in oil and gas fields gained about 25% last year and a similar increase is predicted for 1961.

A Journal field survey shows 38% of plastic pipe in the ground is used for crude-gathering lines, 32% for salt-water disposal and 24% for gas gathering (p. 82).

Other findings: Use of plastic is more widespread among the majors than independents. Economy and resistance to corrosion are big factors favoring plastic pipe. Some complaints also are heard that plastic has no standard pressure rating, expansion and contraction is a problem, and connecting plastic and steel is difficult.

▼ ▼ ▼

Look for European steel to supply bigger chunk of needs for new drilling in Comodoro Rivadavia area of Argentina.

European banking interests are reportedly less shy of taking on sizable financial programs there than their American counterparts. If some of the deals now being talked materialize, it will mean big sales for European metals and equipment firms.

Progress in expanding Canadian export markets in U. S. is indicated by Hudson's Bay Oil & Gas. It plans to find a home for 10,000 bbl. daily of crude and 10,000 bbl. daily of natural-gas liquids through an affiliate, Continental Oil.

The crude will be taken at the Wrenshall, Minn., refinery and the liquids in the Rocky Mountain area through a proposed Hudson's Bay pipeline from Alberta to the Continental system in Montana.

Industry notes: Transwestern Pipeline in first 3 months of its operations showed net profit of $827,000 or 14 cents per share... Gas-industry common stocks are at record peaks. Stock averages for natural-gas firms were $55.74 per share in January and $49.16 per share for natural-gas distribution companies, both records. Gas transmission company common averaged $65.35 per share...New poll of 5,500 geophysicists shows only about 85 in the market for work or a new connection and fourth of these are college students completing their work...Phillips is pleased with Oklahoma and Kansas tests of plan to withdraw guaranteed margins on gasoline to its jobbers and dealers, plans to expand the new policy. It will set a wholesale price in a marketing area and allow jobbers and dealers to maintain own price levels during price wars (p. 60)...Merger has been approved by members of Oil Heat Institute and National Fuel Oil Council...Texas Eastern directors have approved a 2-for-1 stock split and an increase in annual dividend rate...

Market Memo

Feb. 27, 1961

Prices are getting a softer look from market inactivity.

No. 2 is held firm on the coasts but is weaker at interior points. It's a wait-and-see market all over with the weather still the determining factor in which way prices will move.

Gasoline is causing concern to all even before its season opens. Discounts could be had from postings if there were any spot buyers to ask for them.

Mild weather on the East Coast in the wake of the region's longest sustained cold spell gives fuel-oil suppliers a breather.

Suppliers are busier defending recent price increases than they are selling product, although demand is firm and supply tight.

The tanker market may be through setting records for the winter. It was quiet last week following a clean-fuel fixture at ATRS plus 73.75% or $4.96 per ton, for the Gulf to north of Hatteras run. The increase in import quotas for residuel fuel is firming up the foreign-flag market on the Caribbean-East Coast run. It will have the opposite effect on tonnage for Gulf-East Coast voyages.

On the Gulf, No. 2 is firm at 9.50 cents per gallon despite the absence of buyers.

The reason: Refiners are comfortable. Spots are sold up until mid-March. Only one offering is presently available, a split cargo of kerosine and No. 2 for late March delivery.

Discounts of one-half to three-fourths of a cent are available on gasoline. But there's no interest and it's not a question of price. Feeling on the coast, however, is that gasoline prices will hold fairly well until motoring demand rescues them.

Interior markets:

Mississippi River markets are dead for spot sales. No. 2 is one-fourth to three-eighths off the Gulf low but has no buyers. Gasoline is going begging.

Great Lakes and Mid-Continent: No. 2 is drooping, is still being discounted one-fourth after a price drop of one-fourth to 9.25 cents. Gasoline is being discounted from one-half to three-fourths of a cent with 12 cents a gallon for 91-octane the realistic price.

The big Los Angeles market was rocked by a price war last week. Prices were 2 cents off from a 29.9-cent level for regular which had prevailed for a year at major-brand stations.

Tidewater jumped regular to 30.9 just before the war. None followed, instead Texaco cut to 28.9 and Tidewater changed gears to drop the price to 27.9. Most other majors followed to this level.

TO GET WHAT YOU WANT

WHERE YOU WANT IT

WHEN YOU NEED IT

AT REASONABLE

COMPETITIVE PRICES

"Buy From Bovaird"

SUPPLY BOVAIRD COMPANY

OFFICES AND STORES

COLORADO—Denver
ILLINOIS—Carmi, Clay City, Salem
KANSAS—Chase, Great Bend, Liberal, Pratt, Russell, Wichita
LOUISIANA—New Iberia, Shreveport
MISSISSIPPI—Natchez
NEW MEXICO—Farmington, Lovington
OKLAHOMA—Duncan, Oklahoma City, Pauls Valley, Sapulpa, Tulsa
TEXAS—Amarillo, Borger, Colorado City, Dallas, Houston, Midland, Odessa, Pampa

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THE Bovaird SUPPLY COMPANY

GENERAL OFFICES
TULSA, OKLAHOMA

50 YEARS OF PROGRESS WITH THE OIL INDUSTRY

PESA

Inadequate fire protection. Result: a staggering fire loss at this refinery.

This fire need never have spread!

This tank fire did tremendous damage. 30 hours after it started, it was still crumpling storage tanks, buckling railroad cars, twisting track.

Grinnell ProtectoFoam Systems could have saved many of these tanks

When fire breaks out, a Grinnell ProtectoFoam System is ready to go into action. It quickly spreads a uniform blanket of fire-choking foam that covers and extinguishes the blaze. Surrounding tanks are saved.

Grinnell offers you fire protection systems for petroleum products, chemicals, alcohols, solvents, paints, liquefied gas. You benefit from 90 years of fire protection experience when Grinnell designs and installs your systems.

Free 16mm. Sound-Color Film. Grinnell's 35-minute film — "Fire Protection Through Research" — demonstrates all types of special fire hazards, and how to guard against them. To borrow this film — without charge — write: Grinnell Company, Providence 1, Rhode Island.

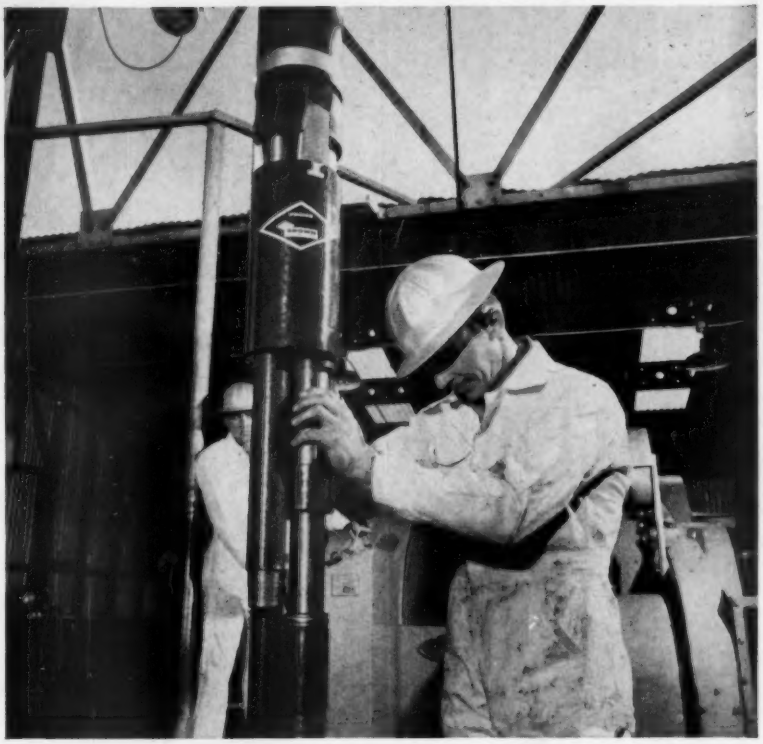
Grinnell ProtectoFoam protection. This bulk oil storage tank is guarded against destruction by fire.

GRINNELL

FIRE PROTECTION SYSTEMS SINCE 1870

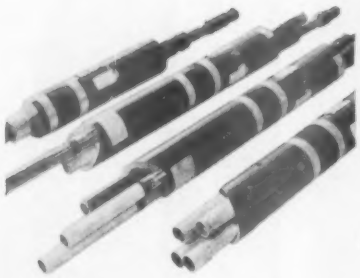
Another new development using

B.F.Goodrich Chemical *raw materials*



NEW TUBING PACKER USES HYCAR

to permit multiple zone completion



Type HS-8 hydraulic-set, retrievable multi-zone tubing packers are made by Brown Oil Tools, Inc., Houston, Texas. Hycar seals are molded by Murray Rubber Company and Houston Rubber Company, both of Houston. B.F.Goodrich Chemical Company supplies the Hycar nitrile rubber.

A new multiple zone tubing packer incorporating Hycar nitrile rubber has already proved itself in many multiple zone completions. As many as four pay zones in a single well have been tapped with the unit.

Requirements were tough. Very little space is available, especially when as many as four tubing strings run through a single seal. Many materials were tested — even soft metal. However, engineers who selected Hycar made this statement: "Hycar 1072 provides a completely dependable seal, standing up under elevated pressures better than any other rubber."

In addition, Hycar withstands constant exposure to well fluids such as sweet and sour crude, distillate, methane gas, salt water and drilling chemicals — fluids that would kill ordinary rubber. You can get more information about how Hycar solves tough oil field operating problems by writing Dept. MF-2, B.F.Goodrich Chemical Company, 3135 Euclid Avenue, Cleveland 15, Ohio. Cable address: Goodchemco. In Canada: Kitchener, Ontario.

Hycar
REG. U. S. PAT. OFF.
Rubber and Latex

B.F.Goodrich Chemical Company
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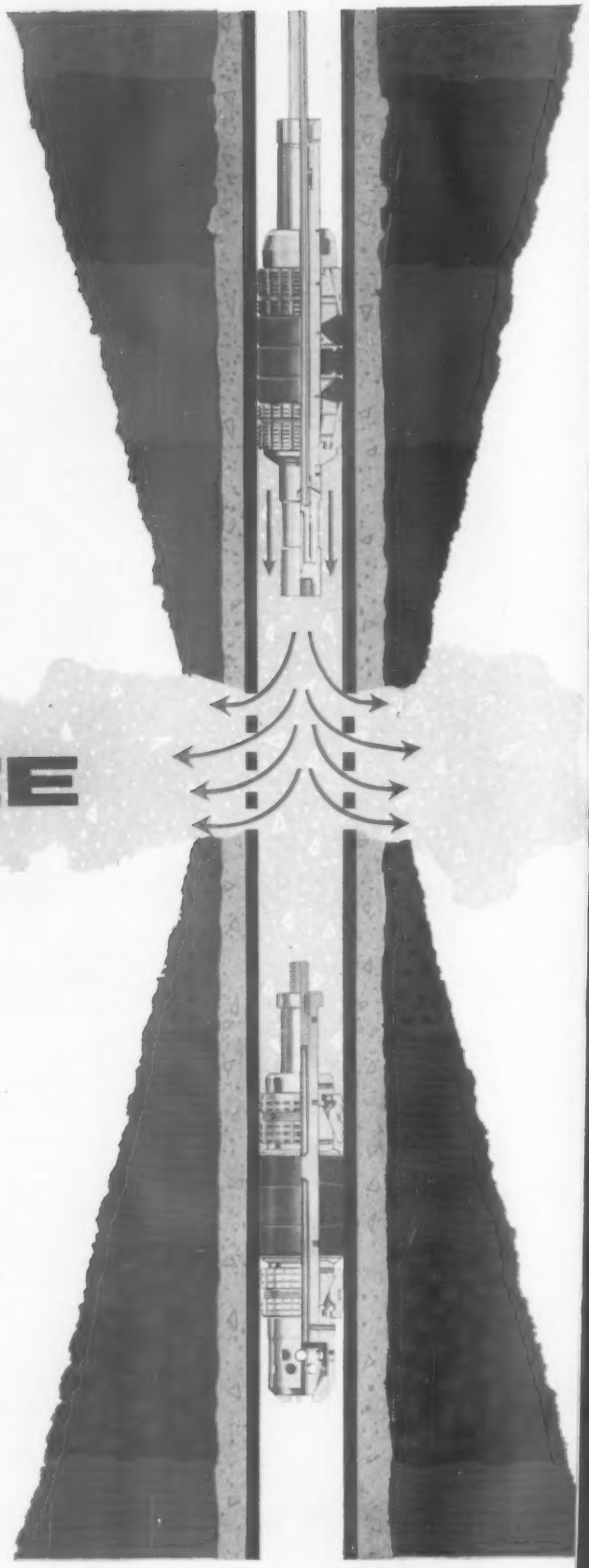
HALLIBURTON PUTS THE SQUEEZE ON DOWNHOLE CEMENTING PROBLEMS



In helping you select the right tools for a cementing string, the best materials to do the job, and the proper techniques for placing the materials, your Halliburton Cementer has at his disposal . . .

- VERSATILE TOOLS in an ever-expanding line!
- MODERN MATERIALS under constant improvement!
- TRUSTED TECHNIQUES completely field proven!

The key to this storehouse of tools, techniques and materials is your Halliburton Cementer's knowledge of how to put the right combination together for you for the *best* results from a remedial cementing job. Put his experience to work for you.

NEW PACKER

at the top

HALLIBURTON "SV-DC" SQUEEZE PACKER is a sliding-valve drillable cast tool. Incorporated into the design of this new drillable tool are proven features of other Halliburton squeeze packers for maximum performance . . . dual slips for better anchoring . . . hard and soft rubbers for maximum sealing . . . *plus the unique, built-in spring loaded, pressure balanced valve to help hold pressure from either direction when closed.* The sliding-valve feature helps prevent loss of mud to formation due to low breakdown pressure, holds annulus fluid load away from weak formation below packer when circulating valve is removed, etc. Available in most popular casing sizes.

TAILORED CEMENTS

in the middle

HALLIBURTON LOW WATER LOSS CEMENTS have been developed to help improve squeeze cementing techniques. The ability of these low water loss compositions help to prevent premature dehydration and slurry loss to thieving formations . . . permitting low pressure squeezing without overdisplacing and high pressure squeezing (by the hesitation technique) with filter-cake or node buildup in perforations.

HALLIBURTON CEMAD-1 is an excellent low temperature, low water loss cement additive for A.P.I. Class A, C, and E Cement and Pozmix Cement.

DIACEL LWL is a combination water loss control agent and retarder for Pozmix and various A.P.I. classes of cement . . . can be accelerated for low temperature application.

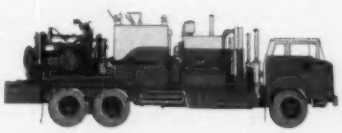
HALLIBURTON LA-2 LATEX is a very unique low water loss additive for cement to produce slurries with improved bonding and better perforating properties.

NEW BRIDGE PLUG

at the bottom

HALLIBURTON WLC BRIDGE PLUG is now available in tubing and in some casing sizes. This bridge plug may be wire line set, or, if the tool is run on tubing, it may be set with a modified mechanical circulating valve. The WLC Bridge Plug is designed to hold differential pressures to 10,000 psi.

SEE YOUR HALLIBURTON CEMENTER for full details on the complete selection of Halliburton tools and materials designed for better squeeze cementing.



CEMENTING SERVICES

Halliburton
COMPANY • DUNCAN, OKLAHOMA

275 Service Centers
. . . just minutes away
from your well

You, too, can get dehydration at a profit . . .

DRY FRAC CONVERTS "EXPENSES" into PROFITS!

To most gas producers, the cost of dehydration is a necessary expense that is required to bring sales gas to pipeline specifications. There are many instances; however, where DRY FRAC can actually convert this expense into profits through initial or increased recovery of valuable hydrocarbons.

Here are four general situations where DRY FRAC can be used economically:

1. Where sufficient pressure drop is not available to operate conventional low temperature separation.
2. Downstream from conventional low temperature separation equipment where enough recoverable heavy fractions are still in the dehydrated gas to justify a DRY FRAC unit.
3. Where gas stream is too lean in heavy hydrocarbons to be processed economically by other means.
4. For dewpoint control where pipeline companies specify maximum hydrocarbon dewpoint as well as maximum water content.

Take another look at your gas production. You may not be realizing your full profit potential. With DRY FRAC you get dehydration to pipeline specification PLUS hydrocarbon recovery in one operation!

BS&B will give you accurate evaluation of wellstream potential and recommend the proper type and size of unit for maximum delivery and a quick payout!

4-TOWER CLOSED SYSTEM

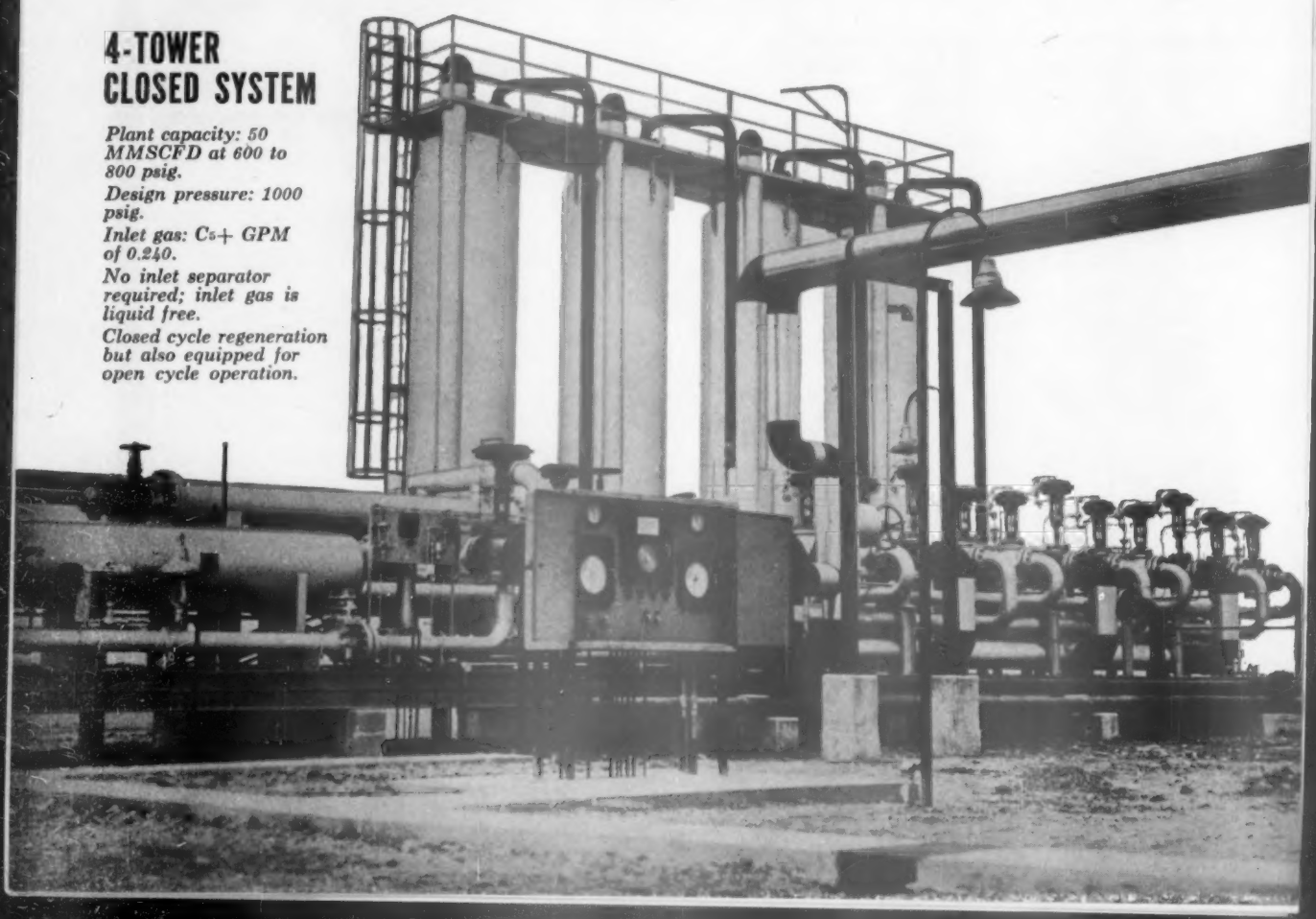
Plant capacity: 50 MMSCFD at 600 to 800 psig.

Design pressure: 1000 psig.

Inlet gas: C_5+ GPM of 0.240.

No inlet separator required; inlet gas is liquid free.

Closed cycle regeneration but also equipped for open cycle operation.



3-TOWER OPEN SYSTEM

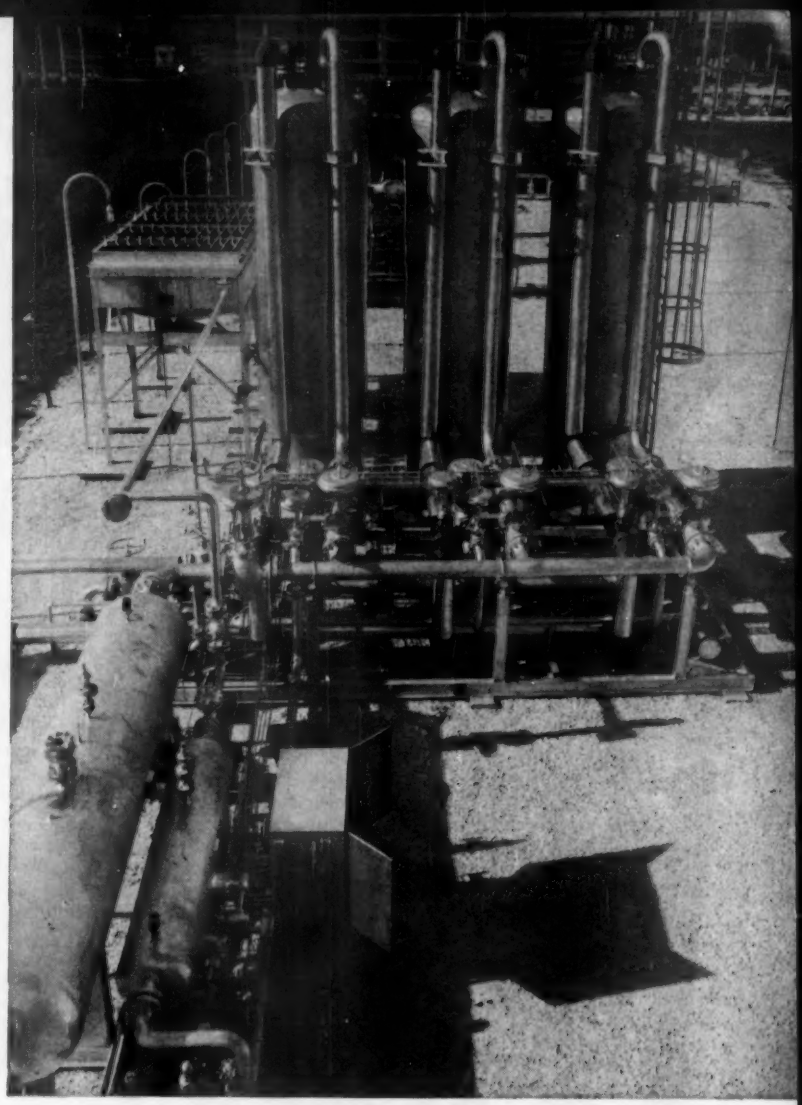
Plant capacity: 62 MMSCFD at 900 psig.
Design pressure: 1200 psig.
Inlet gas: C5+ GPM of 0.067.
Open Cycle regeneration.

BASIC PROCESS OF DRY FRAC

DRY FRAC makes use of two or more dry desiccant beds to adsorb desired components from gas stream. When one bed becomes saturated, gas stream is switched through another bed. Saturated bed is then regenerated by passing heated gas through it to vaporize and drive off components which have been adsorbed on the desiccant. These components are condensed in heat exchange coolers and recovered from the regeneration gas stream.

Two types of regeneration systems may be used. In the "open" system, a side stream of gas from the main gas stream is forced through regeneration system to rejoin main stream ahead of inlet to the adsorbers. In the "closed" system, a trapped volume of gas is continuously recirculated through regeneration cycle by a blower.

DRY FRAC is basically similar to dry desiccant dehydrators except that drying and regeneration cycles have been shortened to utilize a greater weight of desiccant per unit volume of gas processed, while reducing size of adsorbers and total amount of desiccant required.

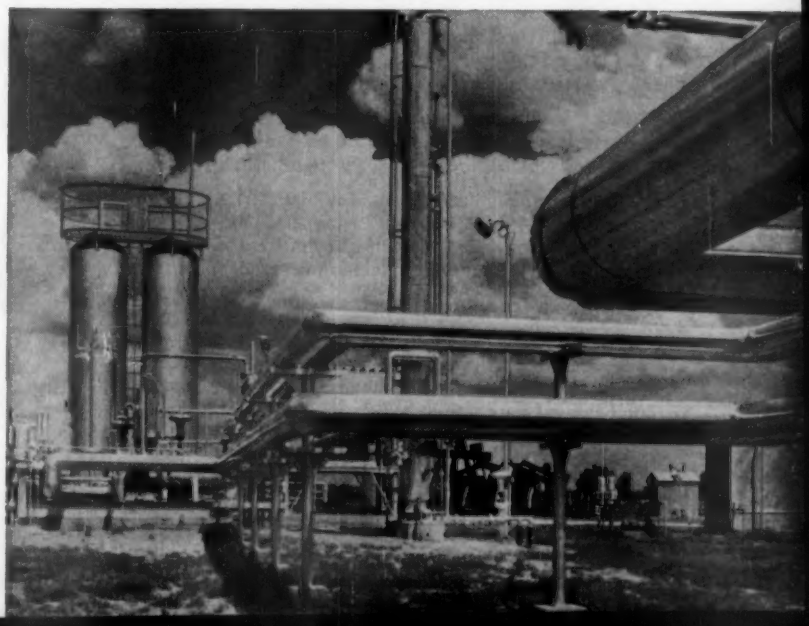


BS&B — EFFICIENCY — GIVEN 60 YEARS — RELIABILITY — ANOTHER EXAMPLE OF PRODUCT LEADERSHIP

BLACK, SIVALLS & BRYSON, INC.

Dept. 1-A2C P. O. Box 1714, Oklahoma City

DRY FRAC is backed by BS&B's many years of engineering experience in all types of hydrocarbon recovery processes.



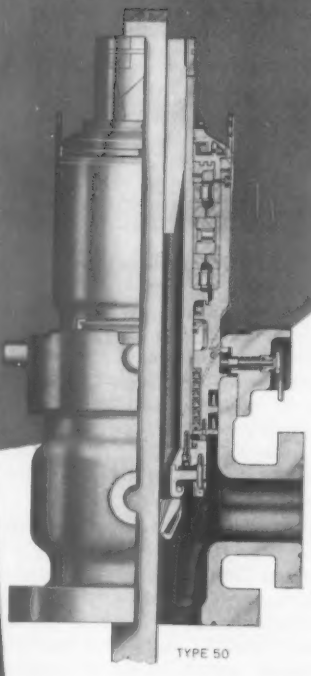
2-TOWER CLOSED SYSTEM

Plant capacity: 6.7 MMSCFD at 1000 psig.
Design pressure: 1200 psig.
Inlet gas: C5+ GPM of 0.739, part of which is separated in inlet separator.
Closed cycle regeneration but also equipped for open cycle operation.

In the Forefront of New Drilling Advancements...

THE SHAFFER ROTATING BLOWOUT PREVENTER

You probably saw the following news item featured in recent technical articles. In it a key role was played by the Shaffer Rotating Blowout Preventer—the blowout preventer that makes possible a wide range of new savings and efficiencies in modern drilling and production techniques...



NEW DEPTH RECORD For Air-Drilling Holes Set at 18,500 FEET!

A West Texas well, bottomed at 18,500 feet, exceeded by some 2,580 feet the former record depth established by air drilling equipment. Inasmuch as the top portion of the hole was drilled with conventional fluid circulation, and the lower portion was drilled with air circulation, some interesting comparisons are available.

For example, the data shows that both the penetration rate and the bit life increased substantially with air drilling as compared to fluid drilling. However, variations in formations at the different depths make these figures interesting but not directly comparable...

During air drilling, continuous pressure control was maintained with a Shaffer Rotating Blowout Preventer. Rig report states: *"No pressure control problems were encountered while this equipment was in use."*

Average Penetration Rate:
... with fluid, 39 ft. per day.
... with air, 153 ft. per day.

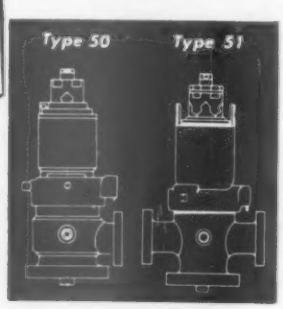
Average Bit Life:
... with fluid, 68 ft. per bit.
... with air, 672 ft. per bit.*

Longest Bit Run:
... with fluid, 265 ft.
... with air, 1,051 ft.*

(**Note:* The insert type bits used for air drilling cost about 5 times that of conventional rock bits, but averaged about *10* times the footage. Net difference, approximately 2 to 1!)

Available in two types...
Type 50 for drilling through 10¾" casing or larger.

Type 51 for slim-hole drilling, drilling-in, production and re-work operations.



There is no other pressure control equipment available that will handle the range or type of applications that are routine for The Shaffer Combination Rotating Blowout Preventer and Stripper.

- Here's a unit that *automatically* maintains continuous pressure seal around the drill string as long as the string is in the hole. No special drill string equipment is needed!
- The Stripper Rubber expands and contracts automatically to seal around the varying diameters of pipe, couplings, tool joints and drill collars as they pass through the unit!
- The Stripper Rubber also adjusts automatically to fit the varying *shapes* of different drill string elements—square, hexagon or octagon kellys as well as cylindrical or out-of-round shapes of pipe, couplings, tool joints and drill collars!
- The seal remains pressure-tight whether the drill string is stationary, is being rotated, or is being raised or lowered!
- The steel-reinforced Stripper Rubber is so designed that the higher the pressure the tighter the seal. Varying pressures are compensated for *automatically!*

The Shaffer Rotating Blowout Preventer is ideal for regular drilling... for drilling under pressure... for drilling with reverse circulation... and for drilling with air or gas instead of mud.

Shaffer Bulletin #1003 contains complete information on this unique blowout preventer. Your nearest Shaffer representative will gladly supply complete details. Or write direct!

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CASPER, WYOMING, Shaffer Tool Works, Post Office Box 827
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Drill String Stabilization

This is just one of the three *families* of Grant Tools made for reaming, hole enlarging and stabilizing. For full information on these, and a wide range of other down-hole and surface tools made by Grant, send for your copy of the complete Grant Catalog today, or see the Grant section of Composite Catalog!

You can get from Grant!

BECAUSE Grant has *specialized* for over 30 years in down-hole tools for reaming and stabilizing, Grant has perfected not one—but *five* distinct types of stabilizers for every drilling requirement . . . all well conditions . . . and each operator's preference. *Three* types of stabilizing reamers deliver full stabilization for the drill collar string. And for drill pipe stabilization, Grant provides the Cushion Stabilizer and the Drilblade—each for proper stabilization and faster penetration *without increased weight on the bit.*

Remember—*only* Grant makes all Stabilizers for *all* requirements, available 24 hours a day in active oil fields everywhere!

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Burst-test for cylindrical-pressure vessels fabricated from USS 9% Nickel Steel, cooled to —320°F, then pressurized to bursting. This one was quenched and tempered—not stress relieved.

Same vessel after bursting at a pressure of 2,160 psi—almost 6 times the design stress of 370 psi.

Operation Cryogenics—Success story of USS

Destruction tests on welded tanks holding liquid nitrogen prove that vessels made from quenched and tempered or double normalized and tempered 9% Nickel Steel, *without* post-fabrication stress relieving, equal—and often exceed—the performance of vessels made of the same steel, which are stress relieved after fabrication.

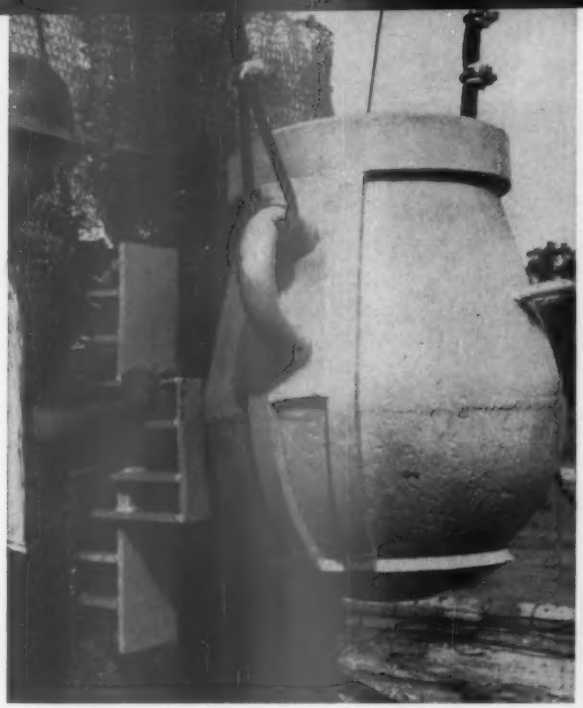
Recently, a series of impact and burst tests, known as 'Operation Cryogenics," were performed on 9% Nickel Steel pressure vessels at the Fairless Works of United States Steel. The science of cryogenics, involving the development and practical utilization of materials in extremely low-temperature service, has assumed major importance in industry and in national defense. Much preliminary and advanced development work has been done cooperatively by The International Nickel Company, Inc., The Chicago Bridge & Iron Company, and United States Steel Corporation.

Objectives of "Operation Cryogenics" were to demonstrate (1) the suitability of 9% Nickel Steel, quenched and tempered or double normalized and tempered, in the as-welded condition (not stress relieved), for very low-temperature use; (2) the excellent properties of quenched and tempered 9% Nickel Steel; (3) the ductile behavior of 9% Nickel Steel in the as-welded condition during enforced failure at very low temperature; (4) the behavior of 9% Nickel Steel in the stress-relieved condition for very low-temperature use.

Test conditions: Two basic types of vessels were tested—rectangular vessels 8 feet square and 6 feet high simulating a type that might be used for shipboard transportation of liquefied gases, and cylindrical vessels 4 feet in diameter and 13 feet long with hemispherical heads such as are used for land-based storage and transportation of liquefied gases. All vessels were welded from economical 9% Nickel Steel plate ⅜" thick, from the same heat of steel.

A total of nine vessels was built for the test. Five were made from 9% Nickel Steel plates and forgings in the quenched and tempered condition (QT) and four in the double normalized and tempered condition (NNT). Further, six of the vessels were tested as welded (AW), without any heat treatment after fabrication. Three were stress relieved (SR).

Impact test results. Impact testing of the three rectangular vessels, refrigerated with liquid nitrogen to -320°F, illustrated that 9% Nickel Steel vessels are capable of undergoing extensive plastic deformation even at extremely low temperatures. The vessels were repeatedly impacted both under pressure and without pressure by blows exceeding 80,000 foot-pounds. One quenched and tempered vessel did not fail, despite 7 impacts. Results clearly indicated the ability of quenched and tempered 9% Nickel Steel vessels in the as-welded condition (not stress relieved) to withstand impacts far beyond any which are likely to occur in service.



4340-pound wrecking ball used in striking rectangular vessels from varying heights.

Impact Test—Rectangular vessel of 9% Nickel Steel quenched and tempered but not stress relieved, refrigerated to —320°F. Withstood severe impact of 82,460 foot-pounds and did not fracture, proving superior strength and toughness of the steel.

9% Nickel Steel Tanks punished at -320°F.

Burst test results. The cylindrical vessels were designed for 370 psi internal pressure (hoop stress in shell equal to 23,750 psi). These vessels were refrigerated to -320°F with liquid nitrogen and pressurized to failure. *The burst pressure for all vessels was at least four times the design pressure of 370 psi and one of the non stress-relieved vessels didn't burst until 2,300 psi.*
(See Table I)

These tests prove that USS 9% Nickel Steel has the high strength, toughness, and weldability needed for low-temperature pressure vessels.

We urge you to consider USS 9% Nickel Steel for economical low-temperature vessels. For the complete story, write to United States Steel, 525 William Penn Place, Pittsburgh 30, Pennsylvania.

USS is a registered trademark

BURST TESTS 9% NICKEL STEEL CYLINDRICAL VESSELS

	PC-1	PC-2	PC-3	PC-4	C-5	PC-6
Heat Treatment	QT	NNT	QT	NNT	QT	NNT
Test Condition	AW	SR	SR	AW	AW	SR
Temp of Vessel (°F) at start of test	—308	—320	—320	—320	—320	—322
Temp. of Vessel at Failure (°F)	—304	—320	—311	—310	—302	—314
Burst pressure (psi)	2,275	1,550	2,125	2,300	2,160	2,100
Burst stress (psi)	135,510	92,920	129,800	135,730	132,500	129,100

TABLE I. Complete data are shown for burst testing of the cylindrical vessels. In each test, the vessel was filled with liquid nitrogen, supply valves were closed, and pumping continued to build up pressure to bursting point. The data show quenched and tempered (QT) or double normalized and tempered (NNT) vessels in the as-welded (AW) condition withstood greater burst pressures and stresses than did the stress-relieved (SR) vessels.

IMPACT TESTS 9% NICKEL STEEL RECTANGULAR VESSELS

	PR-1	PR-2	R-3
Heat Treatment	QT	NNT	QT
Test Condition	AW	AW	AW
Impact number	#9 of 11	#5 of 6	#7 of 7
Vessel Temp. (°F)	—293	—317	—308
Height of Drop, ft.	19	19	19
Kinetic energy of 4340 lb. weight (ft-lb)	82,460	82,460	82,460
Impact Velocity of 4340 lb. weight (fps)	35	35	35
Vessel pressure before Impact (PSI)	106	100	0
Total indentation after test (inches)	2.44	1.38	3.38

Table II. Data are shown only for the impacts which resulted in cracking or fracture of vessels PR-1 and PR-2. The two vessels were subjected to repetitive tests under increasingly severe impact and pressure conditions, leading up to the test which finally enforced failure. Additional impact tests were conducted on the failed vessels to determine further distortion and dimensional effects. For vessel R-3, which did not fail, data are shown only for the last impact.

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Tennessee Coal & Iron—Fairfield, Alabama
United States Steel Supply—Steel Service Centers
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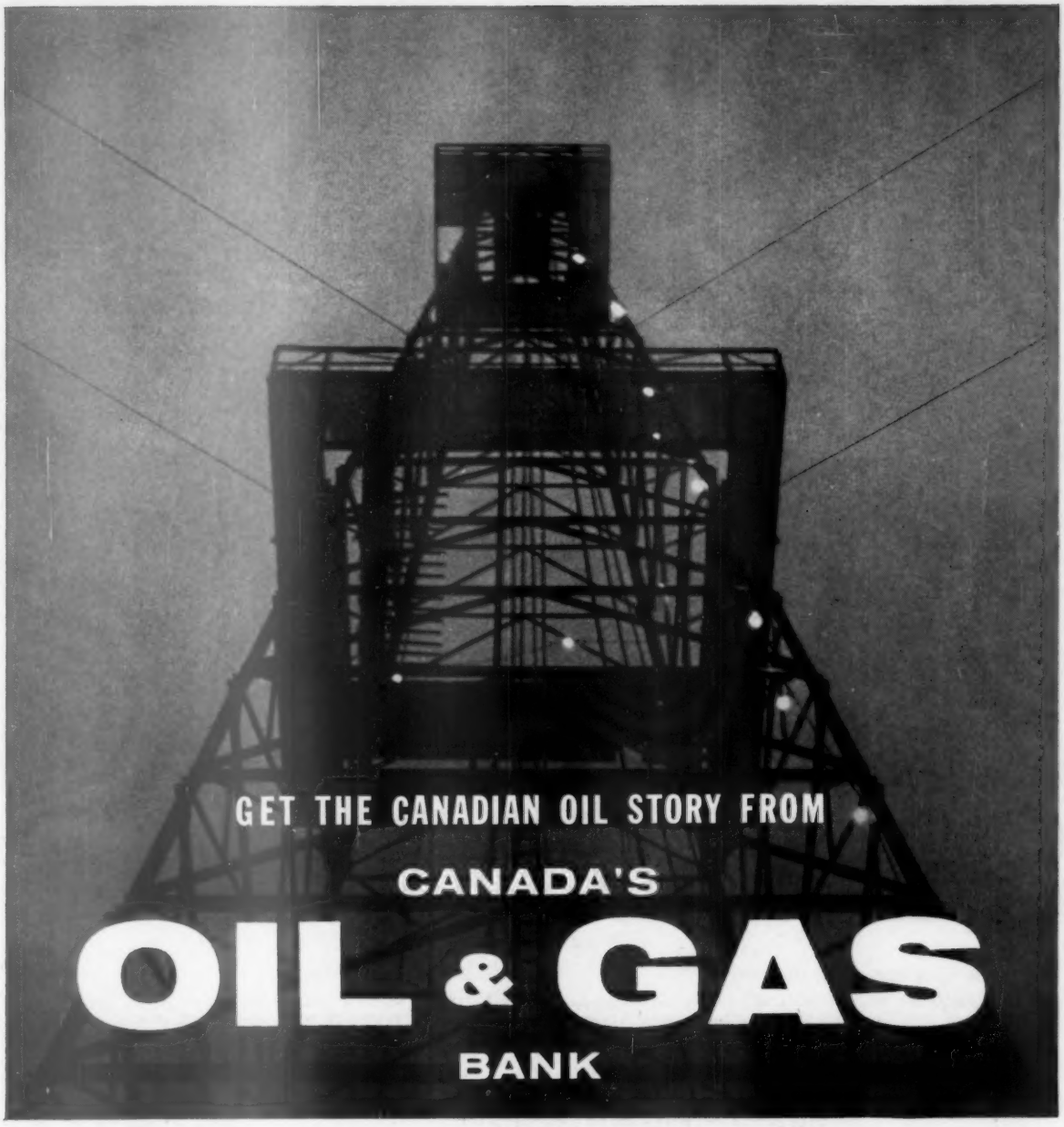

If you are interested in Canada's expanding oil and gas industry, you will find the Royal's *Special Bulletin Service* of value. These bulletins, issued by our Oil and Gas Department, are frequently revised and contain information on all important aspects of the industry — regulations, tariffs, financing, statistics and kindred topics. For a list of current bulletins, write to our Dallas representative, Mr. H. E. McClenaghan, Room 1523, 300 North Ervay St., Dallas 1, Texas; or to The Royal Bank of Canada, Oil and Gas Dept., 409 Eighth Avenue W., Calgary, Alta.

This service is but one of many useful functions performed by our Oil and Gas Department. Manned by practical "oil bankers" with long experience in the field, it is well organized to assist oil and gas men in the financial aspects of their operations.

We do not provide information on oil securities

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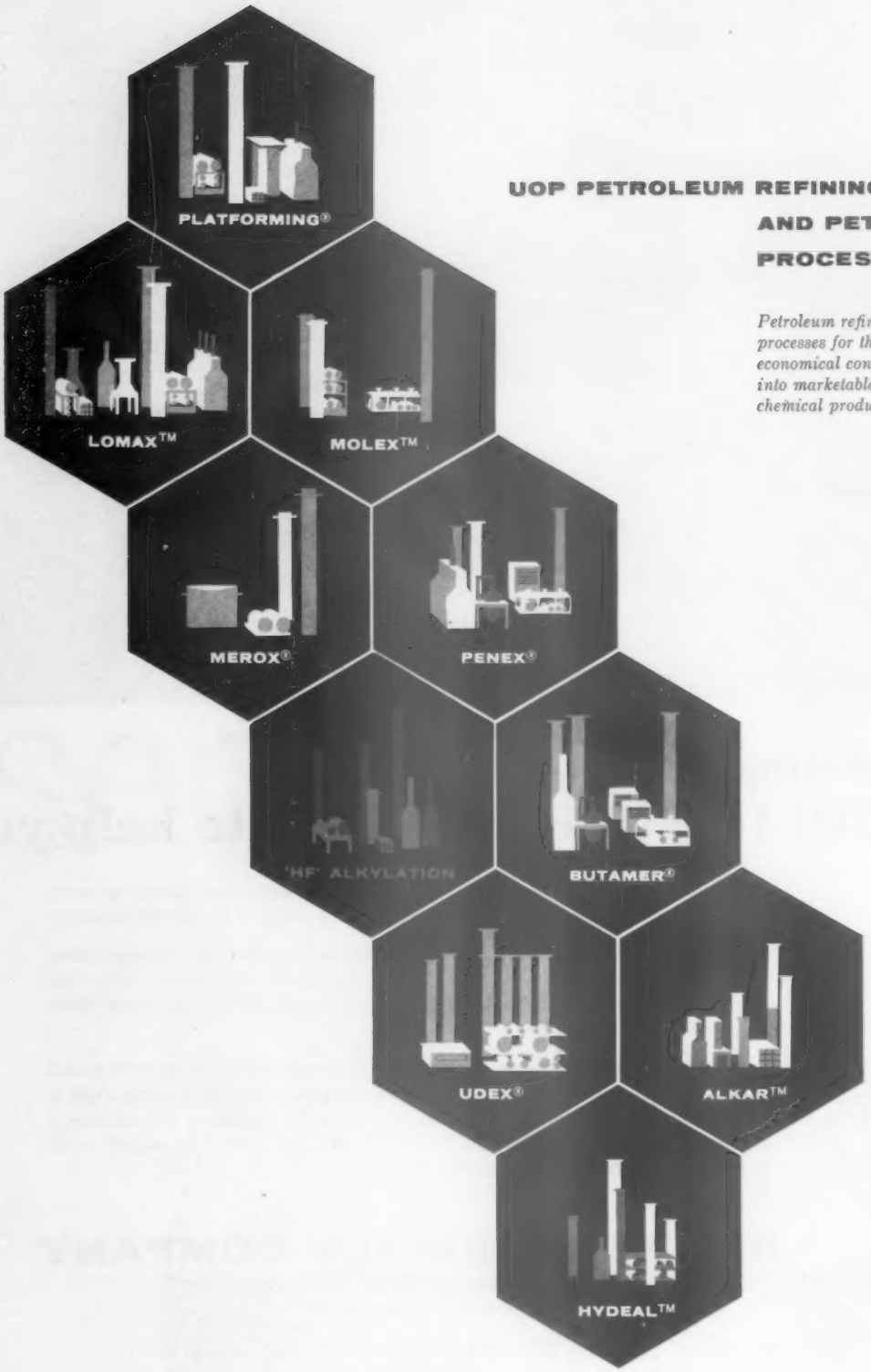

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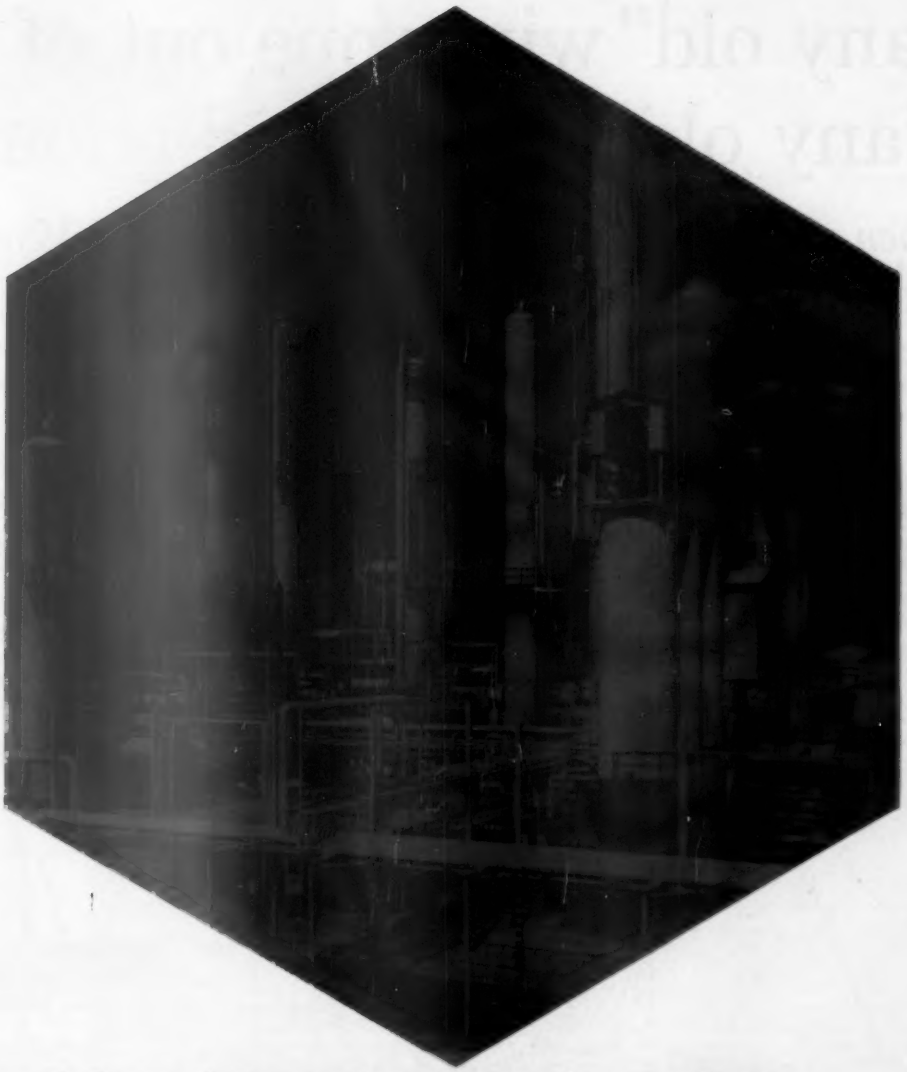

now blend in cleaner burning, highest octane components

"HF" ALKYLATION gives refiners a blending component that combines the ideal qualities of a clean burning fuel that gives smooth engine performance with high octane number. Often refiners find themselves pushed into an economic corner in producing gasolines that burn clean, efficiently, and give maximum power. "HF" Alkylation is a catalytic process that produces an isoparaffinic fuel component that burns with a minimum of carbon deposit . . . greatly reduces surface ignition and consequent rumble . . . and is ideally suited to the auto engine of today.

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Not when you can get what you need from the best combination of wearing qualities in the right Macwhyte!

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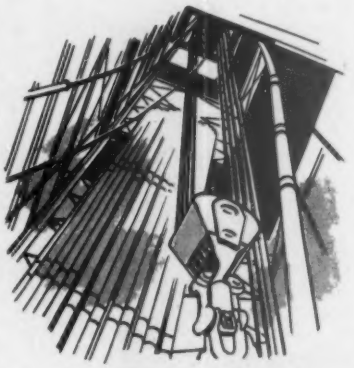
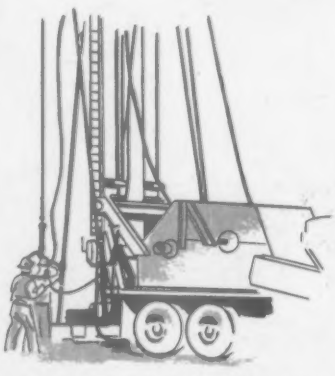
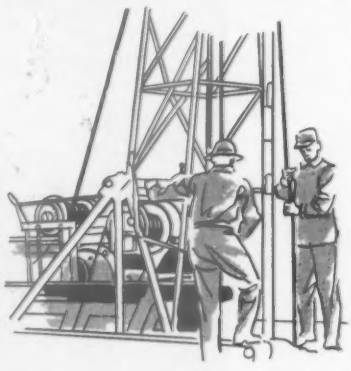


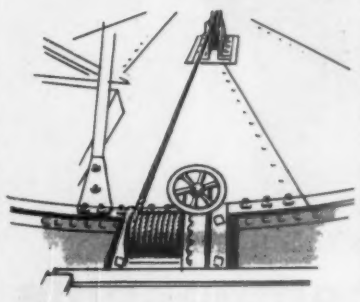
NEED RESISTANCE TO ABRASION?



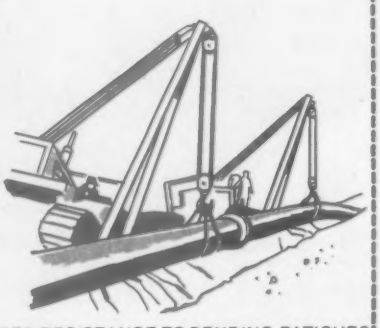
NEED EXTRA REACH AND IMPACT?



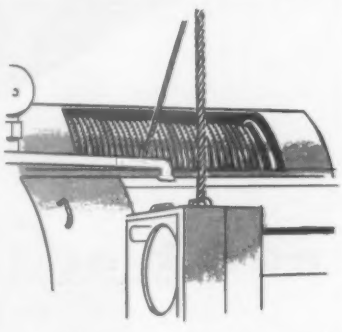
WHICH COMBINATION OF THESE WEARING QUALITIES DO YOU NEED?



NEED RESISTANCE TO CORROSION?



NEED RESISTANCE TO BENDING FATIGUE?



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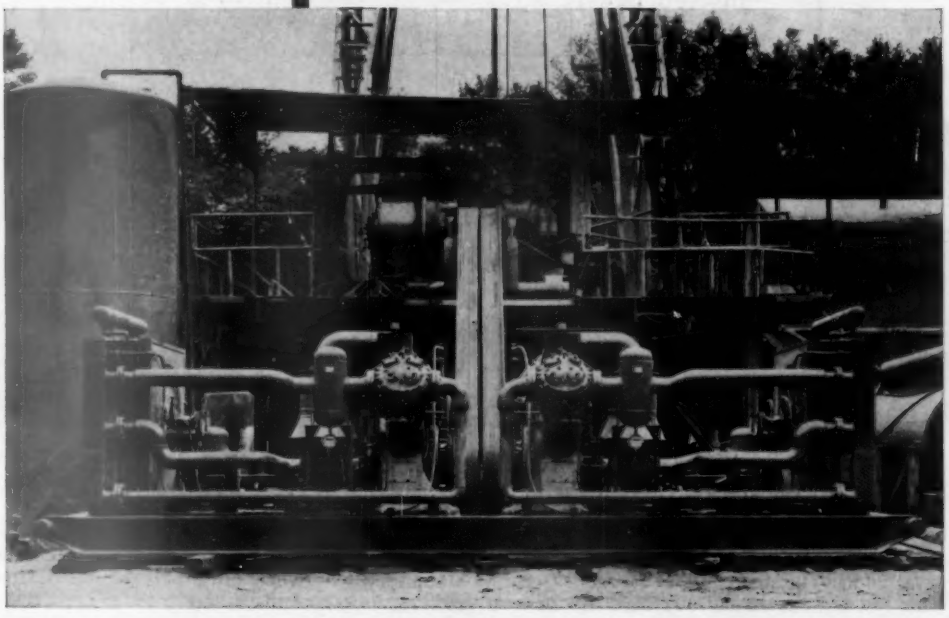

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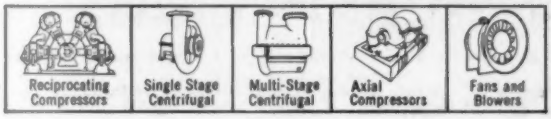
Joy packaged compressors are ready to run when they arrive at the job. The compressor, power unit, heat exchangers, piping and controls are mounted on a single skid. They can be operated on the ground without any foundation, or left on the trailer for frequent short moves.

Power units may be diesel or natural gas. Compressors are available with multiple V-belt drive from the drilling rig, like the unit shown here. There are many types and sizes of Joy packaged compressors for air drilling with capacities up to 300 psi; 400 hp. For complete information on the proper model for your operations, write for bulletin 2823-31.

AIR MOVING EQUIPMENT FOR ALL INDUSTRY



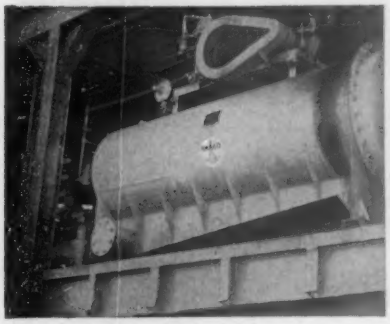
JOY

Joy Manufacturing Company
Oliver Building, Pittsburgh 22, Pa.

In Canada: Joy Manufacturing Company (Canada) Limited, Galt, Ontario

Three good ways to cut drilling costs

The three units shown here are important items behind the recent revolution in drilling fluids that has done so much to speed drilling and cut costs. Each is designed for a different problem but all are efficient and economical. Equally important, all are handled by SWACO -- the leader in mud-treating equipment.



SWACO D-GASSER®

Operators frequently report saving the entire rental cost of a D-Gasser on a well in less than a day.
When mud is gas-cut, the D-Gasser saves money in many ways. It cuts time lost for circulating after trips. It reduces barite costs, it minimizes lost circulation costs and problems. It maintains mud pump efficiency and it actually makes possible the close control of mud weight and viscosity that results in faster drilling with increased safety.

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In addition, since it makes possible the economical maintenance of a low-solids, low-viscosity mud, it actually permits a reduction in bit costs and drilling time.

D-SANDER®

The D-Sander greatly increases the life of mud pump parts and bits when sand or abrasive shale is being drilled. Since it removes virtually all sand-sized solids from the mud, excessive pump-parts and bit-nozzle wear — as well as many other problems — are avoided when a D-Sander is used. There is a size and type to fit every rig and drilling condition.

These descriptions tell just a few of the many ways you can cut costs by mechanical mud treating. For the full story on how you can profit, call your nearest SWACO representative or write us direct.

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The Honeywell Control Valve (foreground) regulates flow of Bunker C fuel oil burner in a chemical process drying system. In the background, a Honeywell diaphragm actuator operates a damper for control of hot air return. Nothing spectacular going on here, but the results of the entire process could well depend on these valves.

The final results—the payoff of the process—are dependent not just on how well these valves are made, not just on their capacity or sensitivity, but on *all* of these things combined . . . plus the process control knowledge that first put them to work, and the know-how that keeps them on the job.

Here, as in all Honeywell Control Valve applications, *every* aspect of valve performance has been considered in relation to the overall control system. It is this "whole picture" approach that sets Honeywell Control Valves apart, and rewards you with better processing.

Write today for your copy of our checklist, "25 Ways to Be Right" . . . in selecting control valves.

MINNEAPOLIS-HONEYWELL, Fort Washington, Pa.

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Engineering Progress Report

FROM UNION CARBIDE CHEMICALS COMPANY

REDUCE GAS-SWEETENING COSTS

Two simple control tests increase plant efficiencies

Chemical analysis is the only quick and efficient method of gauging the operating efficiencies of plants that use monoethanolamine to sweeten natural gas. By proper interpretation of the simple, yet accurate tests, plants can be operated more efficiently and at some cost saving.

Quick titrations can give this information and enable the plant operator to keep safely below solution overloading, thus minimizing corrosion and solution contamination.

TEST NO. 1—ACID GAS CONCENTRATION

The total acid gas content of both the rich and the regenerated lean solutions is determined by simple titration. By comparing the acid gas contents of these solutions, before and after regeneration, the regeneration efficiency and the net solution loading can be determined. This net solution loading (the amount of acid gas removed by the solution) should check with an acid gas material balance around the absorber.

An excess of acid gas in both the rich and lean solution indicates solution overloading or improper regeneration.

When the rich solution loading is high, while the lean solution loading is quite modest (here indicating good regeneration), one of three things may be at fault: (1) Insufficient scrubber fluid circulation; (2) Insufficient amine concentration; (3) either more gas is being processed than anticipated, or the acid gas content is higher than originally expected.

An excess of acid gas in the lean solution, when the rich solution is not overloaded, indicates improper regeneration or severe solution contamination.

STEAM REQUIREMENTS FOR REGENERATION

Enough stripping vapor should be provided to the regeneration column to remove essentially all the acid gas from the rich solution before it enters the reboiler. Normal steam rates vary between 0.8 and 1.2 pounds of steam per gallon of amine solution circulated.

FLUID CIRCULATION

In plants with all carbon steel equipment the amine solution circulation rate should be adequate to keep the net solution loading at or below 0.4 moles of total acid gas (CO_2+H_2S) per mole of monoethanolamine. Under these conditions, in the conventional plant, the rich solution will contain less than 0.5 moles of total acid gas per mole of amine; and the lean solution will contain 0.1 or less moles of total acid gas per mole of amine.

Contamination can be controlled by a side stream distillation unit that removes foreign materials and amine degradation products.

TEST NO. 2—MONOETHANOLAMINE CONCENTRATION

By titrating a sample of the lean solution with standard HCl, to a pH of 4.5, the per cent of monoethanolamine free for acid gas absorbtion can be determined. This information allows for proper control of amine concentration and, therefore, proper setting of the circulation rate.

OTHER TESTS

Union Carbide has for many years maintained laboratories for the examination of scrubber solutions, and for basic research in gas treating technology. These are two of many analytical tests described in the paper "An Approach to Monoethanolamine Solution Control: Chemical Analysis and Its Interpretation." This paper relates chemical analysis to plant operation and suggests remedial steps found effective in eliminating operational difficulties. For a copy, use the coupon provided.

UNION CARBIDE is a registered trade mark of Union Carbide Corporation.

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Dept. G, 270 Park Ave., New York 17, New York

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- ☐ Have a representative call.
- ☐ Send me information on_____

Name_____Position_____

Company_____

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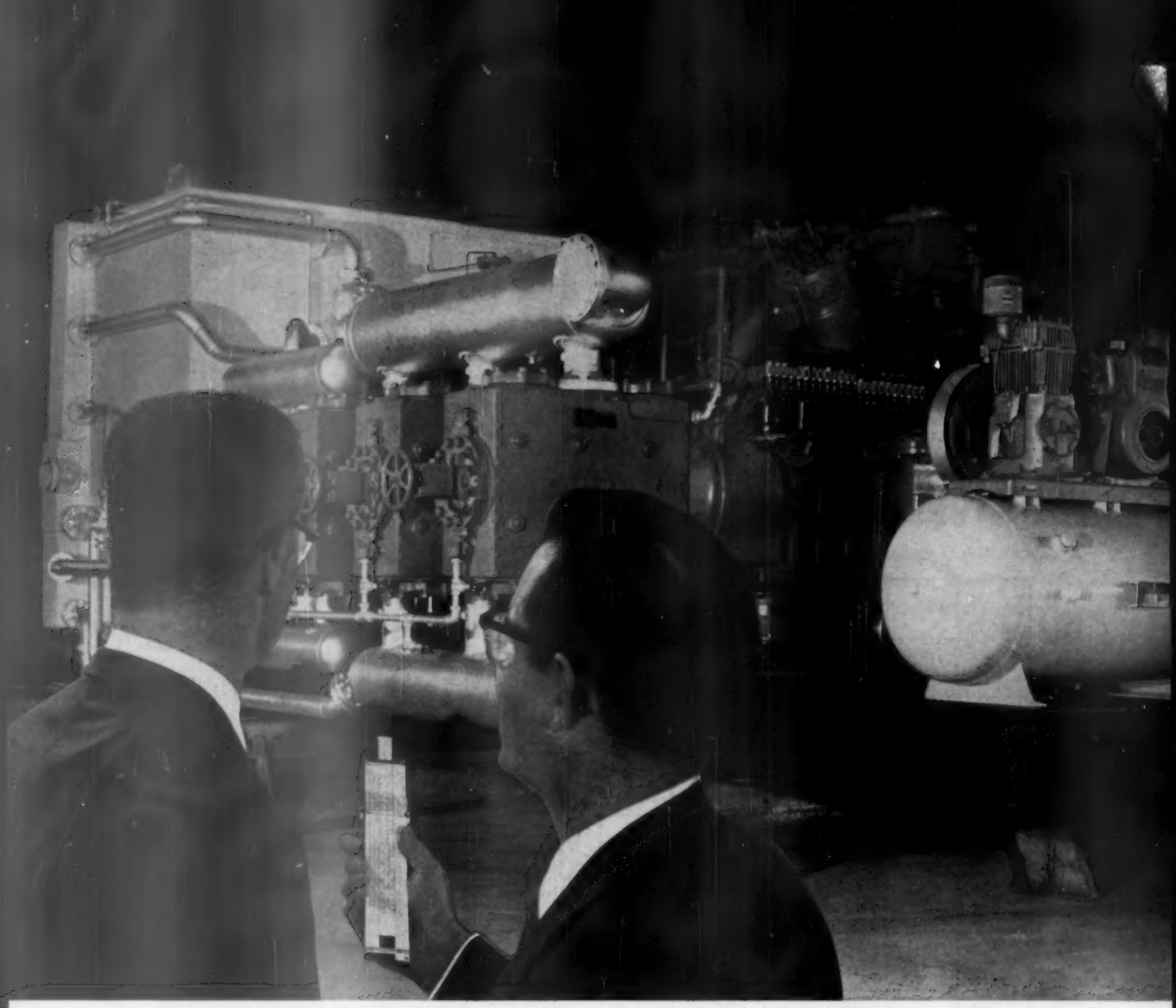

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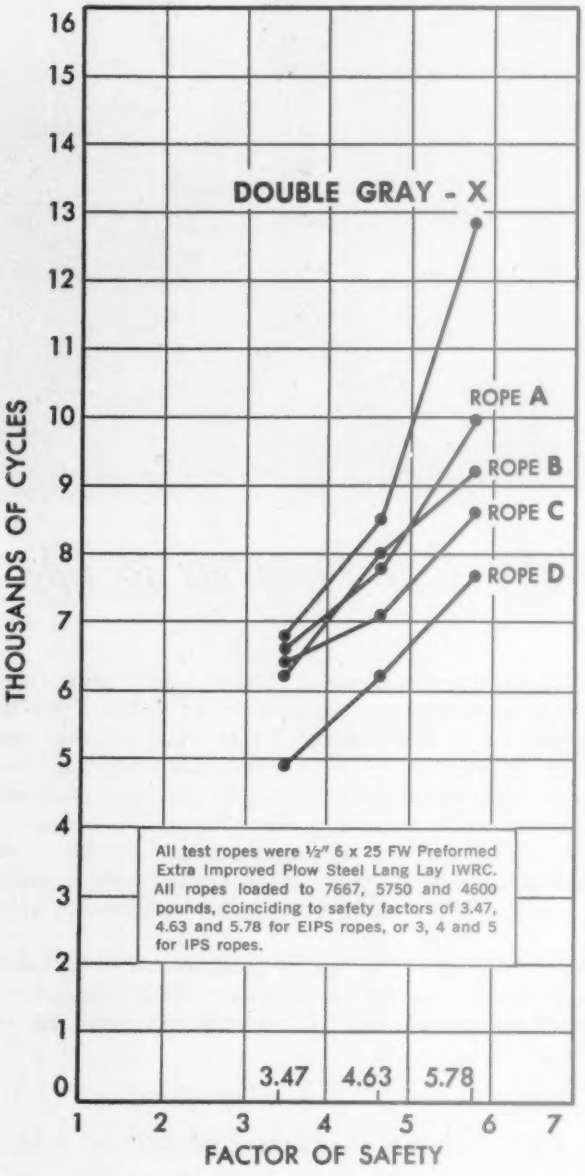
Laboratory tests prove that CF&I-Wickwire's premium wire rope has 45%* more bending life than the average of other ropes tested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ROPE A
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THOUSANDS OF CYCLES
FACTOR OF SAFETY
3.47
4.63
5.78
All test ropes were ½" 6 x 25 FW Preformed Extra Improved Plow Steel Lang Lay IWRC. All ropes loaded to 7667, 5750 and 4600 pounds, coinciding to safety factors of 3.47, 4.63 and 5.78 for EIPS ropes, or 3, 4 and 5 for IPS ropes.

The CF&I-Wickwire engineers who developed Double Gray-X *believed* in their product. So confident were they of its superiority that they decided to field-test prototypes of Double Gray-X as soon as they were perfected. In the months that followed, the top American firms chosen to participate in these tests delivered this verdict: when the going really gets tough, Double Gray-X lasts longer than other wire ropes.

Now, CF&I presents additional proof that Double Gray-X has *superior resistance to bending fatigue,* the chief enemy of wire rope life. In an extended series of tests conducted over the past year at CF&I's Palmer Plant, Double Gray-X proved itself superior to four other wire ropes, all made by major manufacturers.

HOW WERE THE TESTS CONDUCTED?

The five wire ropes tested—all identical in size and specification — all exceeded the catalog breaking strength of extra-improved plow steel ropes. Each rope was subjected to the same series of tests on a 25,000-pound, multiple-reeved fatigue machine, the largest of its kind. This machine punishes wire rope to destruction by bending it back and forth over sheaves.

*Percentage above average of all other wire ropes tested at safety factor of 5.78

lasts longer

WHAT WERE THE RESULTS OF THE TESTS?

As the chart indicates, Double Gray-X lasted longer than any of the four competing wire ropes at all the safety factors used in the test. At the highest and most commonly-used safety factor, Double Gray-X lasted 30% longer than the rope that lasted next longest, and 68% longer than the rope that lasted the shortest time. Double Gray-X lasted 45% longer than the average of all other wire ropes tested at this safety factor.

WHY DOES DOUBLE GRAY-X LAST LONGER?

It lasts longer because it's the result of a breakthrough in wire-drawing technique. This new process, which includes the use of molybdenum disulphide, creates these outstanding fatigue-resistance factors in Double Gray-X:

- **A Molecular Shield** – Molybdenum disulphide creates a shield around every wire, which serves as a lubricant and prevents the wires from grinding together as the rope operates. Less internal friction results in longer rope life.

- **Smoother Wire Surface** – CF&I's new wire-drawing technique helps eliminate minute surface imperfections in the wire. This smoother surface provides better resistance to fatigue.

- **Extra Toughness** – Molybdenum disulphide lubricates the wires during the drawing process. Since less power is required and less heat generated during this operation, the original toughness of the wires is better preserved.

WHAT CAN DOUBLE GRAY-X DO FOR YOU?

It can save you money. Because Double Gray-X lasts longer on even the toughest jobs, it cuts wire rope repair and replacement costs and rope-installation time. The net result to you is an overall reduction of costly equipment downtime, and a lowering of your total wire rope investment.

As a matter of fact, those of our customers who have already bought and field-tested Double Gray-X have reported considerably longer life and less downtime on their equipment. Join these satisfied customers—try Double Gray-X on *your* equipment right away. Ask your CF&I salesman to give you complete details on these tests.

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When ordering a tool joint compound, remember it's protection for the threads that you are buying. And for this purpose WECO No-Gall or Lo-Tork are the finest compounds you can use.

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In response to this need, UOP offers a unique and highly valuable service that includes determining your precise inhibitor needs, based upon inspection and study of your fuels. From this analysis, we will determine the best inhibitor or most effective inhibitor blend recommended for each type of fuel you market.

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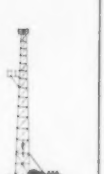

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Clear Height 133',
Nom. Gross Capacity
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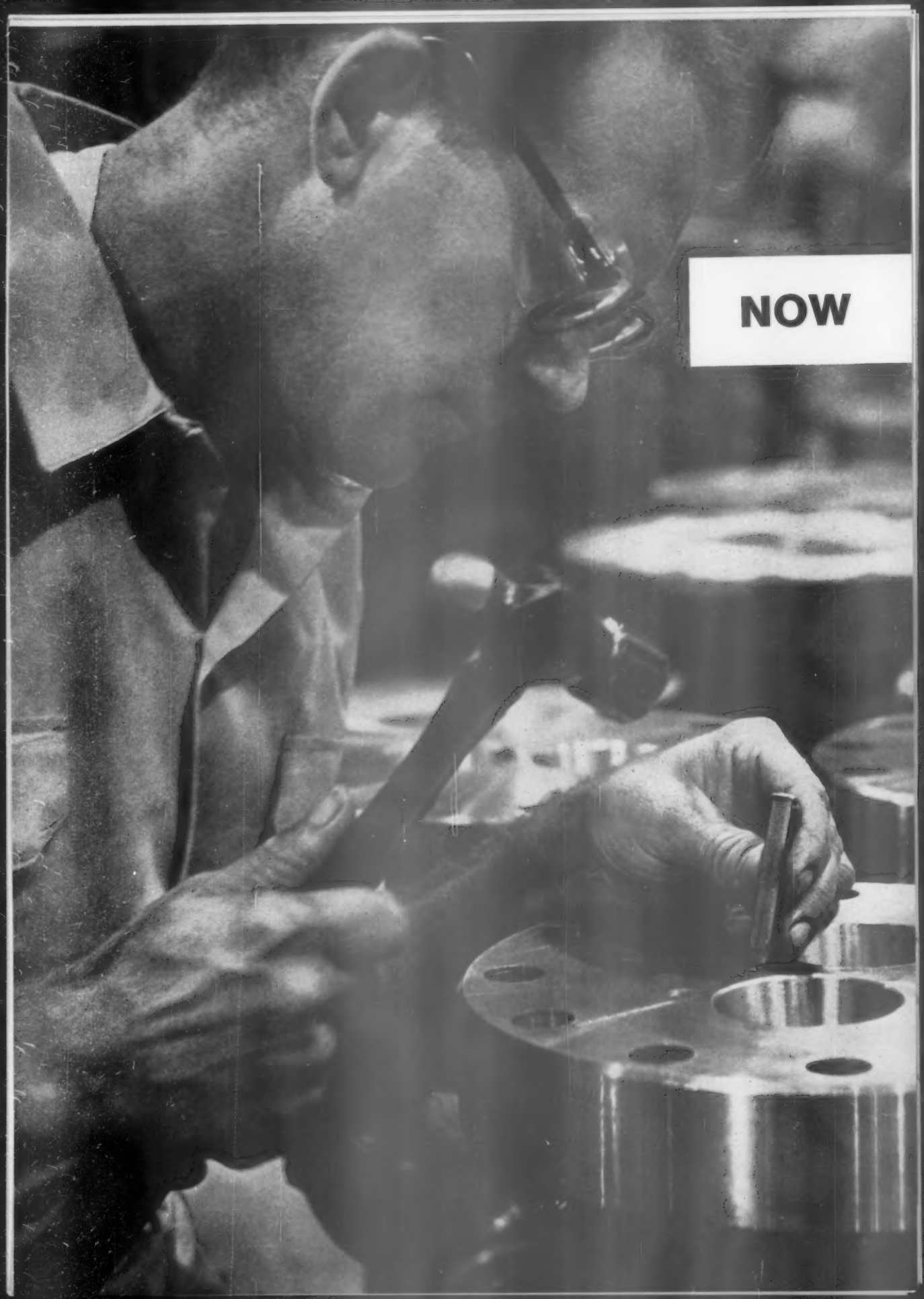
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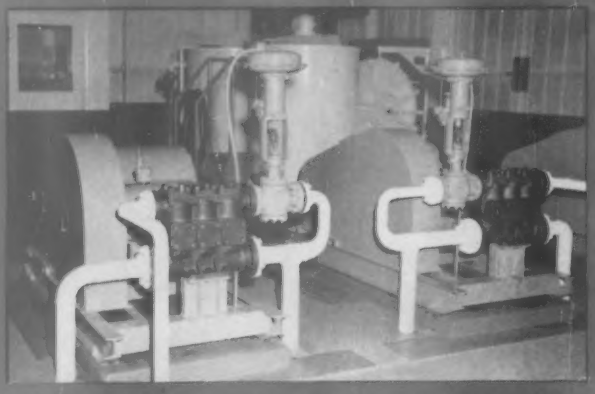
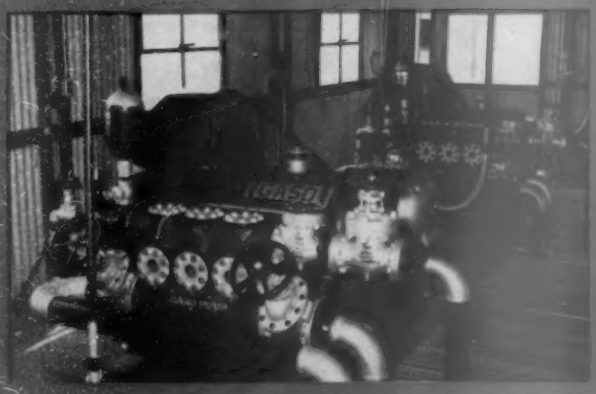
WHY YOU CAN LOOK TO THE LEADER FOR TOP PERFORMANCE IN

WATER FLOOD SERVICE

Fig. 3364 Gaso Horizontal Triplex Pump with ceramic plungers, aluminum bronze fluid end and Monel Valve assemblies, powered by 20 HP electric motor. Capacity, 850 BPD at pressures up to 1200 p.s.i.



Operating at 350 RPM, each of the three injection pumps in this installation (Gaso Fig. 3365 Horizontal Triplex Plunger pumps) delivers 1075 barrels per day at 1500 pounds discharge pressure.



Only service required on this Gaso Fig. 3466 Horizontal Triplex Plunger pump in discharging 1½ million barrels of salt water was the replacement of the plungers — at a total cost of $73.89.

Whatever the need, you may depend on Gaso for pumps and fittings best suited to the conditions. Illustration shows a Gaso Fig. 3671 Pump in salt water disposal service in Louisiana.

Where else but from the leader can you buy pumps embodying so much experience, so many advances and refinements, such demonstrated operational efficiency and maintenance economy? Where else can you find so complete a line and such cooperative pump service specialists as Gaso distributors? When the selection of pumps is governed by the yardstick of value, the logical choice is GASO Pumps. Our engineers welcome the privilege of applying their specialized experience to any problem involving water flood pumping service.

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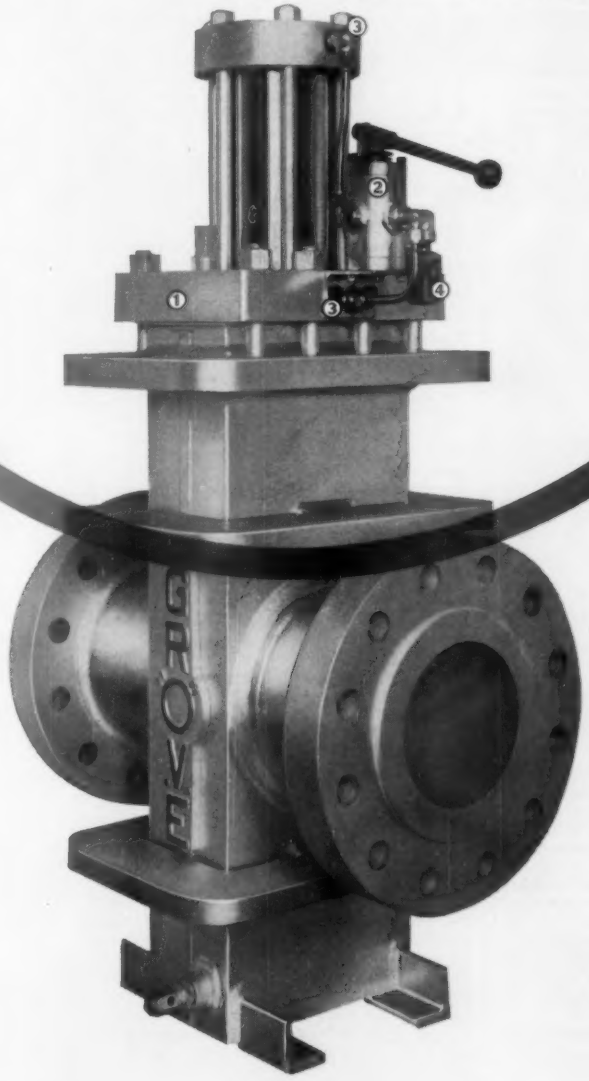

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SPECIAL REPORT TO MANAGEMENT

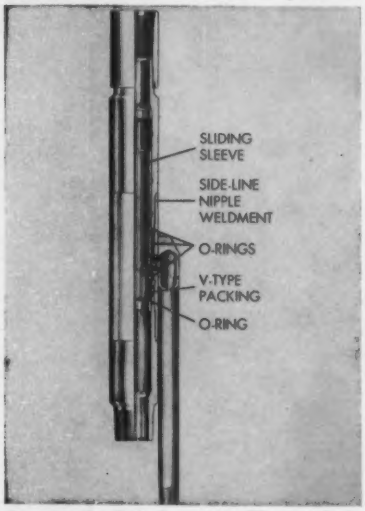
OTIS PRODUCTION NEWS

Volume II, Number 2 | **Otis Engineering Corporation • Dallas** | *Production Equipment and Services*

New Otis Cross-Over Tool Solves Zone Feeding Problem In Single String Dual Completions

Sliding Side-Door® With Special Weldment Provides Complete Zone Isolation With Cross-Over Chokes Out of Well

CORPUS CHRISTI — Another downhole completion and production problem has been solved by Otis Engineering Corporation with the development of a new type of cross-over tool. The new tool is essentially a Type A Otis Sliding Side-Door to which has been added a special one-inch pipe weldment on one side of the outer mandrel, in place of



the usual slotted ports. The tool is designed to be made up in the tubing with a short tubing sub and Type S Otis Landing Nipple above it and a tubing sub and Ported Landing Nipple below it, and then set in a dual or by-pass type packer. When installed with a Type SS Otis Plug Choke set in the ported nipple, the sleeve may be opened to permit production from the upper zone to be brought into the tubing through the one-inch pipe weldment while flow from the lower zone is directed into the annulus.

See schematic well diagram — right

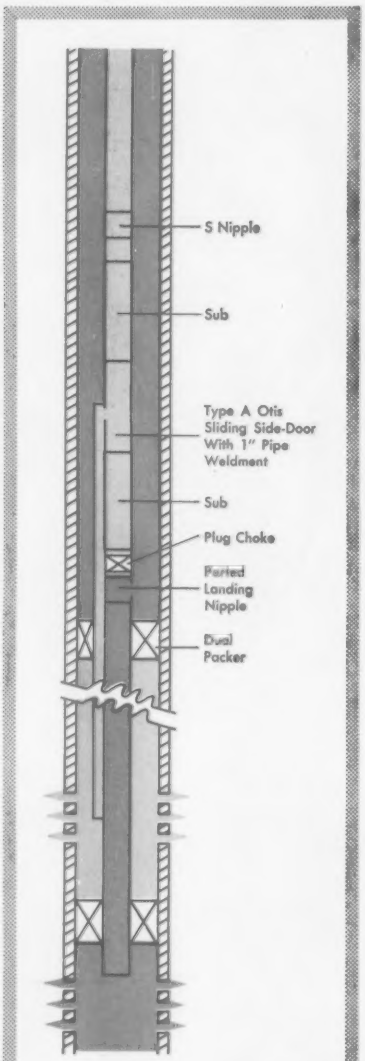
If desired, a straight flow choke may be landed in the assembly to permit production of the lower zone through the tubing while flow from the upper zone is produced through the annulus.

This new Otis Sliding Side-Door Cross-Over was developed at the request of a progressive Texas-based producing company which had experienced extended periods of lost production from the low pressure zones in its single string dual completions after changing a cross-over choke in conventional cross-over equipment, or when a choke had been out of the well for a short period of time for various types of wire line work. This loss of production proved to be the result of the high-pressure zone feeding the low-pressure zone.

According to the company, the new Otis Sliding Side-Door Cross-Over not only proved effective in solving its zone feeding problems, but it has also eliminated the need of having a pump truck on location to equalize pressure across the two zones — as was frequently necessary before the choke could be removed from conventional cross-over equipment. The company also reports it has successfully fractured the upper zone of a number of its wells through the one-inch pipe without damaging the tool.

The Type A Otis Sliding Side-Door, from which this new type of cross-over was derived, is a circulating and production tool which is used downhole to provide selective communication between the tubing and the annulus. The tool has a ported sleeve which is designed to be moved up or down within a ported mandrel. The sleeve may be shifted by one of two ways: 1) by standard wire line methods, or 2) by pumping down an expendable shifting tool. V-type packing and O-rings are used to provide a positive seal between the sleeve and the mandrel when the sleeve is closed.

The new Otis Sliding Side-Door Cross-Over is another example of the ingenuity of Otis' well completion specialists in the field and its engineering department in Dallas. Literally thousands of production problems of this nature have been solved by Otis over the past 32 years. For more information on the new Otis Sliding Side-Door Cross-Over, or for help with any specific production or completion problem, call the Otis office nearest you or write Otis, Dept. 2-W, Box 35206, Dallas 35, Texas. You will find your Otis specialist ready to help you — anxious to serve you.



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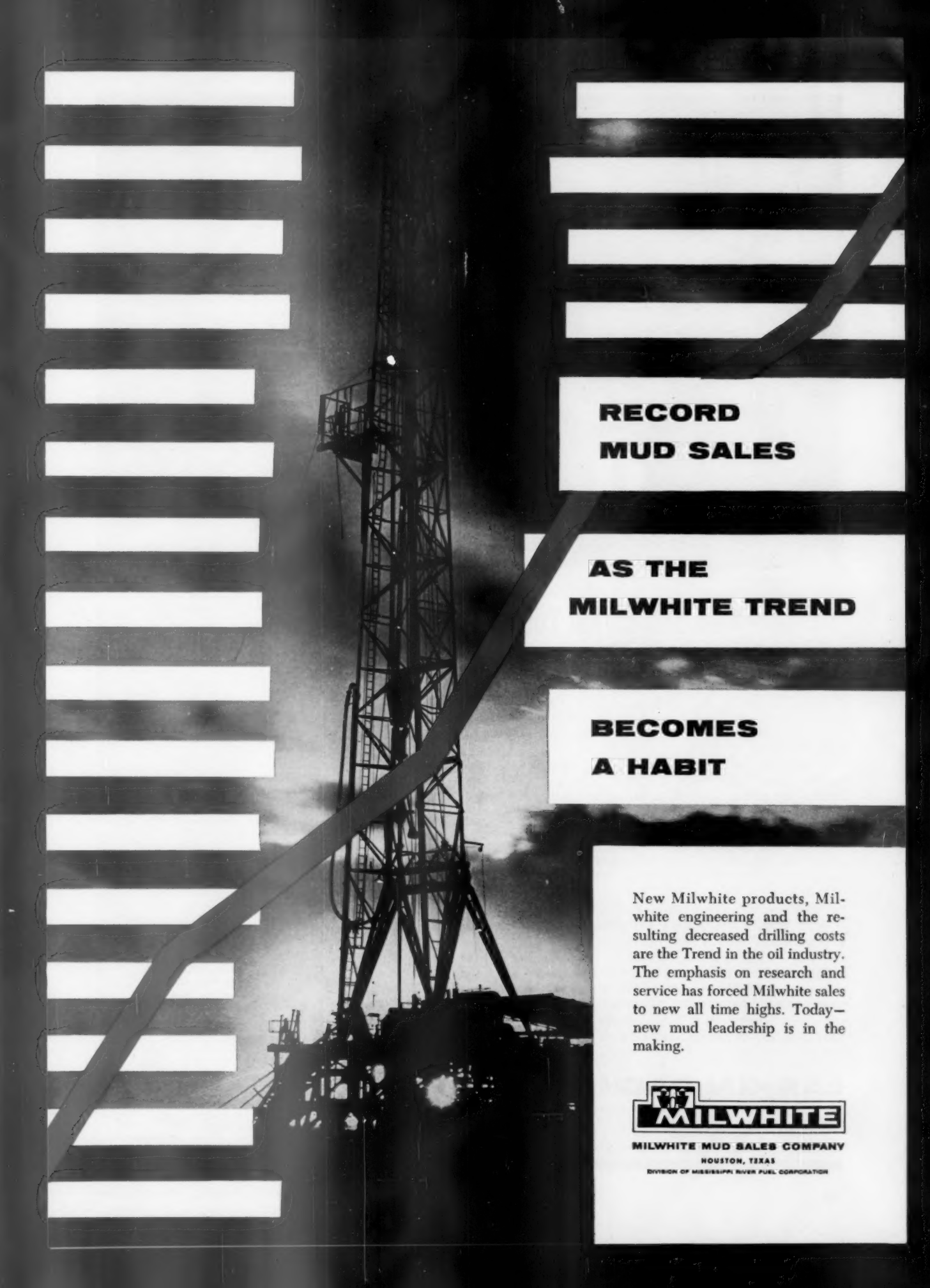
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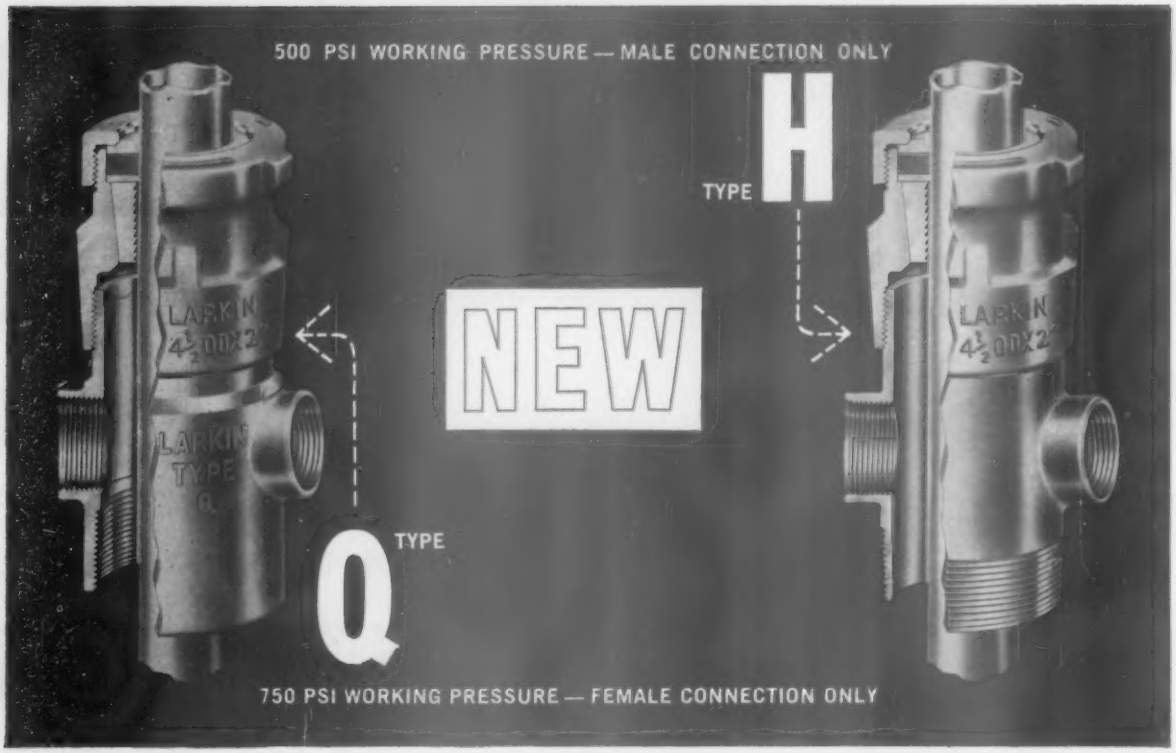

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Larkin Type Q and Type H Heads bring to the low pressure field a completely new line of economical, high quality, slip-suspension tubing heads in a really complete range of sizes.

They are available in sizes from 2″ Reg. or EUE tubing through 7″ OD casing. Their three segment hinged slips will safely suspend up to 5000 feet of ¾″ through 2½″ EUE tubing or up to 3000 feet of 3″ Reg. through 4″ EUE tubing.

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They Say—

Credit where it's due

Dear Sir:

As chairman of ASTM Committee D-2 on petroleum products and lubricants, I wish to express my appreciation of the space and excellent reporting given to the recent symposium on "Current Research on Motor Gasoline Which May Effect Future Specifications" in the Journal issue of February 13 ("For Gasoline Makers, the Problems Keep Changing," p. 52).

However, there was one oversight that I wish to call to your attention. The entire symposium was conceived, developed, and presented by Technical Committee A on Gasoline of ASTM Committee D-2.

The American Society for Testing Materials, as a society, had no hand in the symposium, and credit should go to Technical Committee A and Committee D-2.

The general report did not mention either of these committees and, to that extent, does not reflect the fine work Committee D-2 is doing for the petroleum industry in the fields of developing standard test methods, specifications, and promulgating pertinent information about petroleum products, as was done at this symposium.

Harold M. Smith, Chairman
ASTM Committee D-2

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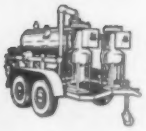

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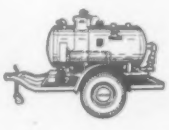

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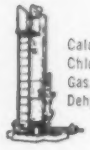

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In German they say "Gut Gemacht."

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Letters to They Say should be addressed to The Editor, The Oil and Gas Journal, Box 1260, Tulsa, Okla.

CALENDAR

FEBRUARY

26-Mar. 1 American Institute of Chemical Engineers, petrochemical and refining exposition, Municipal Auditorium, New Orleans, and national meeting, Hotel Roosevelt, New Orleans.

26-Mar. 2 American Institute of Mining, Metallurgical, and Petroleum Engineers, annual meeting, Chase and Park Plaza Hotels, St. Louis.

27 Canadian Society of Exploration Geophysicists, conference on exploration geophysics—today and tomorrow, Pallister Hotel, Calgary.

28-Mar. 1 API Committee on Public Affairs, New York regional conference on employe communications, Park-Sheraton Hotel, New York City.

MARCH

2 Petroleum Equipment Suppliers Association, north Mid-Continent district meeting, Mayo Hotel, Tulsa.

3 Ohio Oil and Gas Association, winter meeting, Deshler Hilton Hotel, Columbus.

3 Southern Gas Assoication, transmission section, annual spring manage-

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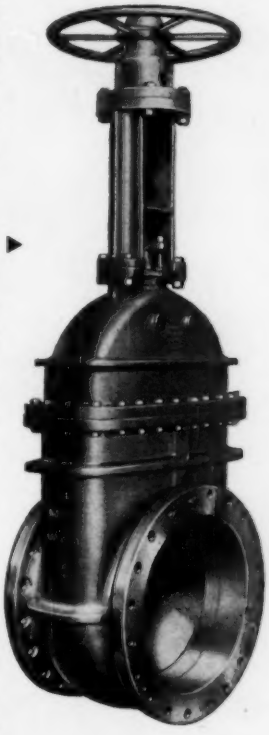

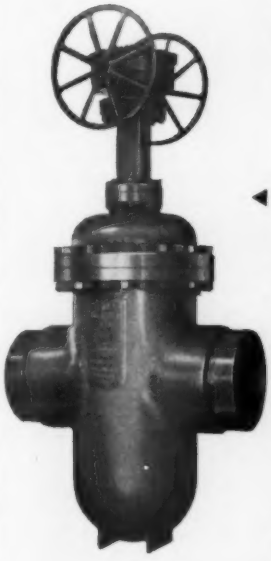

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ment conference, Sheraton-Dallas Hotel, Dallas.

5-9 American Society of Mechanical Engineers, gas-turbine power division, and U. S. Department of Defense, annual gas-turbine conference and products show, Shoreham Hotel, Washington.

7 Petroleum Equipment Suppliers Association, Pacific district meeting, Ambassador Hotel, Los Angeles.

7-8 University of Oklahoma, School of Geological Engineering, seventh biennial geological symposium, Student Union Building, University of Oklahoma, Norman.

8-9 API Committee on Public Affairs, Chicago regional conference on employe communications, Sheraton-Towers Hotel, Chicago.

8-10 American Petroleum Institute, Division of Production, southern district meeting, Captain Shreve and Washington-Youree hotels, Shreveport, La.

13-16 Kentucky Petroleum Marketers Association, sixth management institute, conducted by the University of Louisville, Brown Hotel, Louisville.

13-17 National Association of Corrosion Engineers, annual meeting and corrosion show, Hotel Statler, Buffalo, N. Y.

15-17 Natural Gasoline Association of America, annual convention, Baker Hotel, Dallas.

16-17 International Oil and Gas Educational Center, study of the economics of petroleum exploration, development, and property valuation, Southwestern Legal Center, Dallas.

20 American Gas Association, general management section conference, Francis Marion Hotel, Charleston, S. C.

21-23 American Power Conference, twenty-third meeting, Sherman Hotel, Chicago.

21-30 American Chemical Society, 139th annual meeting, Kiel Auditorium, St. Louis.

22 American Institute of Chemical Engineers, Chicago section, symposium on new developments for chemical processing and new developments for the engineer and management, Conrad Hilton Hotel, Chicago.

22-24 American Petroleum Institute, Division of Production, southwestern district meeting, Cole Hotel, Albuquerque.

23 National Industrial Conference Board, general session, Shamrock-Hilton Hotel, Houston.

23-24 North Texas Oil and Gas Association, annual meeting, Kemp Hotel, Wichita Falls, Tex.

27-28 University of Wichita, School of Engineering, third annual production institute, university campus, Wichita.

27-29 Midwest Gas Association, annual meeting and convention, Sheraton-Fontenelle Hotel, Omaha.

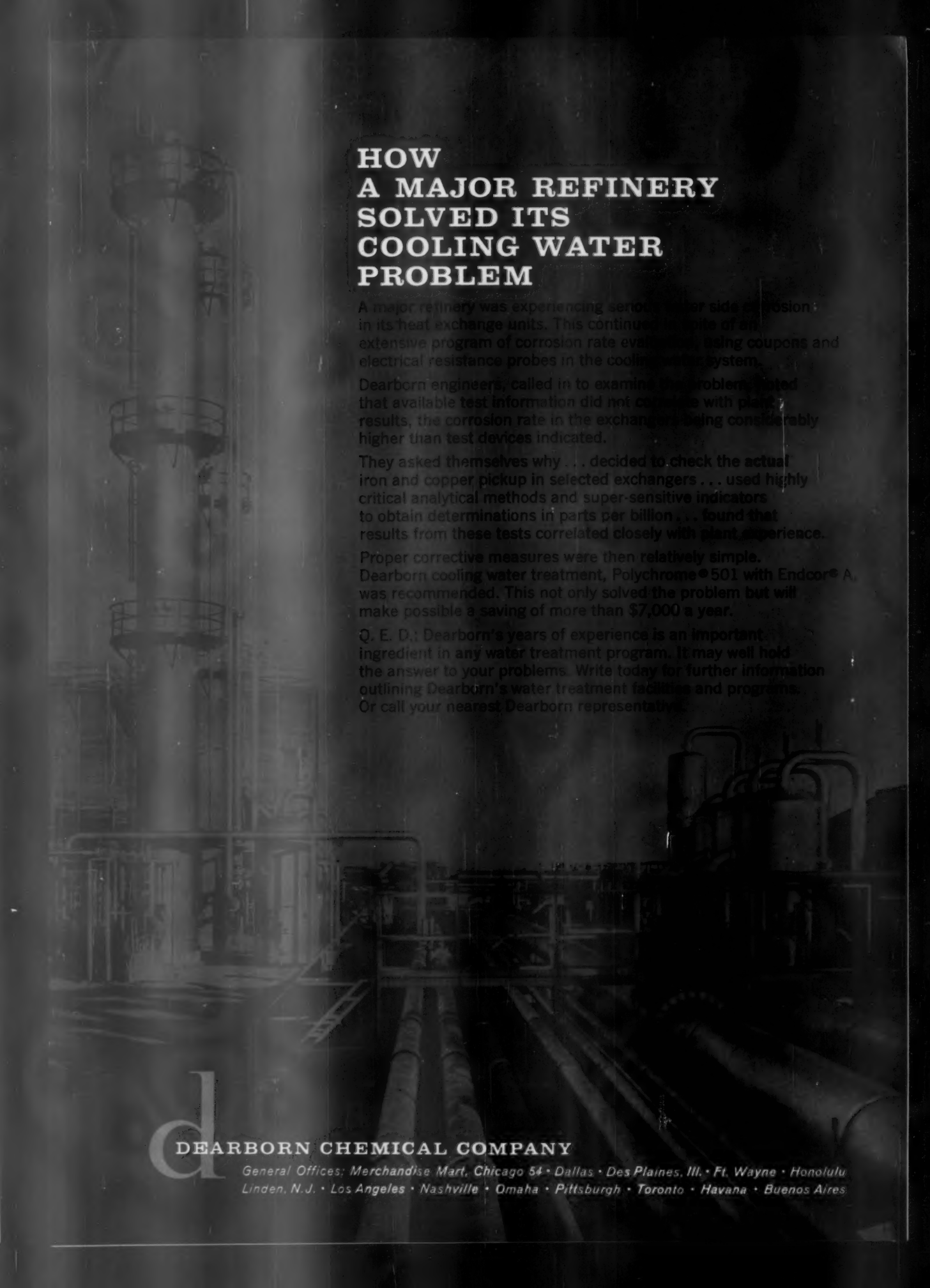
27-29 Society of Petroleum Engineers of AIME, Saudi Arabia section, regional meeting, Dhahran, Saudi Arabia.

27-31 Instrument Society of America, symposium on temperature measurement and control in science and industry, Veterans Memorial Auditorium, Columbus, Ohio.

28-29 University of Oklahoma, Schools of Petroleum and Gas Engineering, gas conditioning short course, Oklahoma Memorial Union Building, University of Oklahoma, Norman.

APRIL

4 Instrument Society of America, New Jersey section, annual symposium on



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electronic process instrumentation, Hotel Essex House, Newark, N. J.

4-5 University of Kansas, gas compressor institute, Liberal, Kans.

5-6 Third annual symposium on pilot plant and process automation, Ambassador Hotel, Los Angeles.

5-7 American Petroleum Institute, Division of Production, Mid-Continent district meeting, Mayo Hotel, Tulsa.

6-7 University of Oklahoma, School of Mechanical Engineering, short course on industrial engines, University of Oklahoma, Norman.

6-8 Texas Oil Jobbers Association, Petroleum Marketers Association, convention and trade show, Baker Hotel, Dallas.

7-9 American Institute of Mining, Metallurgical, and Petroleum Engineers, Southwestern Alaska Chapter, sixth annual mining, minerals, and petroleum conference, Anchorage, Alaska.

8-12 Petroleum Equipment Suppliers Association, annual meeting, The Greenbrier, White Sulphur Springs, W. Va.

10-11 American Society of Mechanical Engineers, maintenance and plant engineering conference, Bancroft Hotel, Worcester, Mass.

10-12 Western Petroleum Refiners Association, annual meeting, Granada Hotel, San Antonio, Tex.

10-13 American Society of Mechanical Engineers, oil and gas power conference and exhibit, Jung Hotel, New Orleans.

11-13 Petroleum Industry Electrical Association and Petroleum Electric Supply Association, annual conference, Moody Convention Center, Galveston, Tex.

12-14 Investment Bankers Association of America, annual convention of the Texas group, Shamrock Hilton Hotel, Houston.

17-19 Instrument Society of America, symposium on instrumental methods of analysis, Shamrock Hilton Hotel, Houston.

18-20 University of Oklahoma, southwestern gas measurement short course, North Campus, University of Oklahoma, Norman.

19-20 University of Tulsa, fifteenth annual conference of accountants, University campus, Tulsa.

19-20 National Petroleum Association, semi-annual meeting, Hotel Sheraton-Cleveland, Cleveland.

20-21 Society of Petroleum Engineers of AIME, East Texas-Louisiana-Arkansas gas-technology symposium, Tyler, Tex.

20-21 Texas Technological College, annual West Texas oil lifting short course, Lubbock, Tex.

20-22 Illinois Society of Professional Engineers, annual convention, Peoria, Ill.

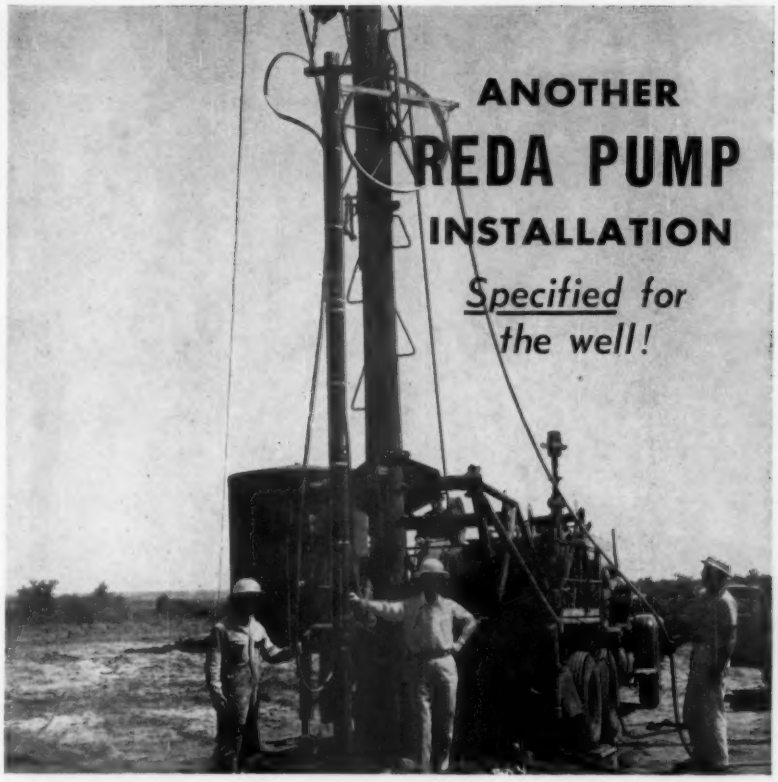
24-26 Southern Gas Association, meeting, New Orleans.

24-27 American Association of Petroleum Geologists, Society of Economic Paleontologists, and Rocky Mountain section of AAPG, annual meeting, Denver Hilton Hotel, Denver.

26-28 American Petroleum Institute, Division of Transportation, pipeline conference, Chase-Park Plaza Hotel, St. Louis.

27-28 Rocky Mountain Oil and Gas Association, midyear meeting, Northern Hotel, Billings, Mont.

28 Natural Gasoline Association of America, Oklahoma regional meet-



REDA Does the Job Better and at LOWER COST

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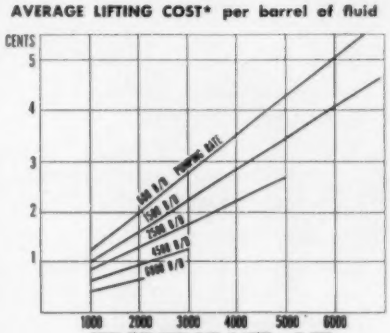

*Included: Electric Energy (10 Mills Per KWH), Rum and Pull, Repairs, Upkeep, Transportation, Labor and Amortization (8 Yrs.)

Chart "A"

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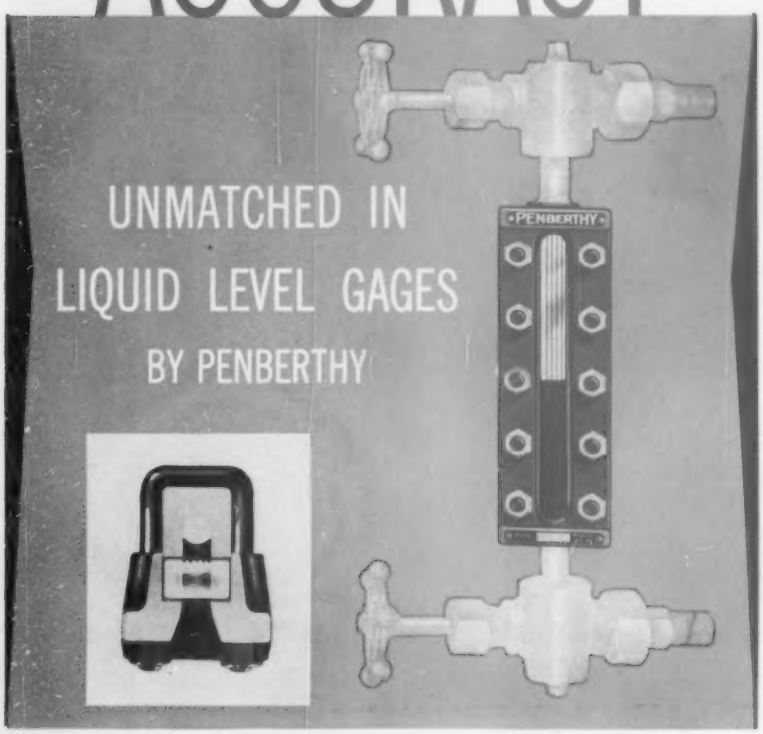

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MAY

2-4 Purdue University, School of Civil Engineering, sixteenth industrial-waste conference, Purdue Memorial Center, Lafayette, La.

3-5 American Petroleum Institute, Division of Production, Rocky Mountain district meeting, Gladstone-Henning Hotel, Casper, Wyo.

4-5 Society of Petroleum Engineers of AIME, oil recovery conference, Midland, Tex.

4-5 Pacific Coast Gas Association, Inc., transmission conference, Biltmore Hotel, Santa Barbara, Calif.

7-10 American Institute of Chemical Engineers meeting, Sheraton-Cleveland Hotel, Cleveland.

8-11 American Petroleum Institute, Division of Refining, midyear meeting, Rice Hotel, Houston.

9-11 Western Joint Computer Conference and Exhibit, Ambassador Hotel, Los Angeles.

10-12 American Society of Mechanical Engineers, production engineering conference, Royal York Hotel, Toronto.

10-12 Canadian Institute of Mining and Metallurgy, oil and gas division, and Calgary and Edmonton petroleum engineering sections of Canadian Institute of Mining and Metallurgy and American Institute of Mining, Metallurgical, and Petroleum Engineers, annual meeting, McDonald Hotel, Edmonton, Alta.

11-12 American Petroleum Institute, Division of Production, Pacific Coast district meeting, Biltmore Hotel, Los Angeles.

14-17 Texas Independent Producers and Royalty Owners Association, Scharbauer Hotel, Midland, Tex.

16-19 American Petroleum Institute, Division of Marketing, midyear meeting, Americana Hotel, Miami Beach.

17-19 Western Petroleum Refiners Association, Mid-Continent regional technical-industrial relations meeting, Hotel Lassen, Wichita.

19 Natural Gasoline Association of America, Permian Basin regional meeting, Lincoln Hotel, Odessa, Tex.

21-24 American Petroleum Institute, Division of Transportation, midyear highway conference, Bellevue Stratford Hotel, Philadelphia.

24-25 Western Petroleum Refiners Association, computer conference, Ben Franklin Hotel, Philadelphia.

25-26 American Institute of Mining, Metallurgical, and Petroleum Engineers, annual Rocky Mountain petroleum sections, joint meeting, Salt Lake City.

JUNE

1-2 Kentucky Oil and Gas Association, annual meeting, Phoenix Hotel, Lexington.

5-6 Petroleum Electric Power Association, meeting, Mayo Hotel, Tulsa.

6-8 Instrument Society of America, summer instrument-automation conference and exhibit, Royal York Hotel and Queen Elizabeth Hall, Toronto.

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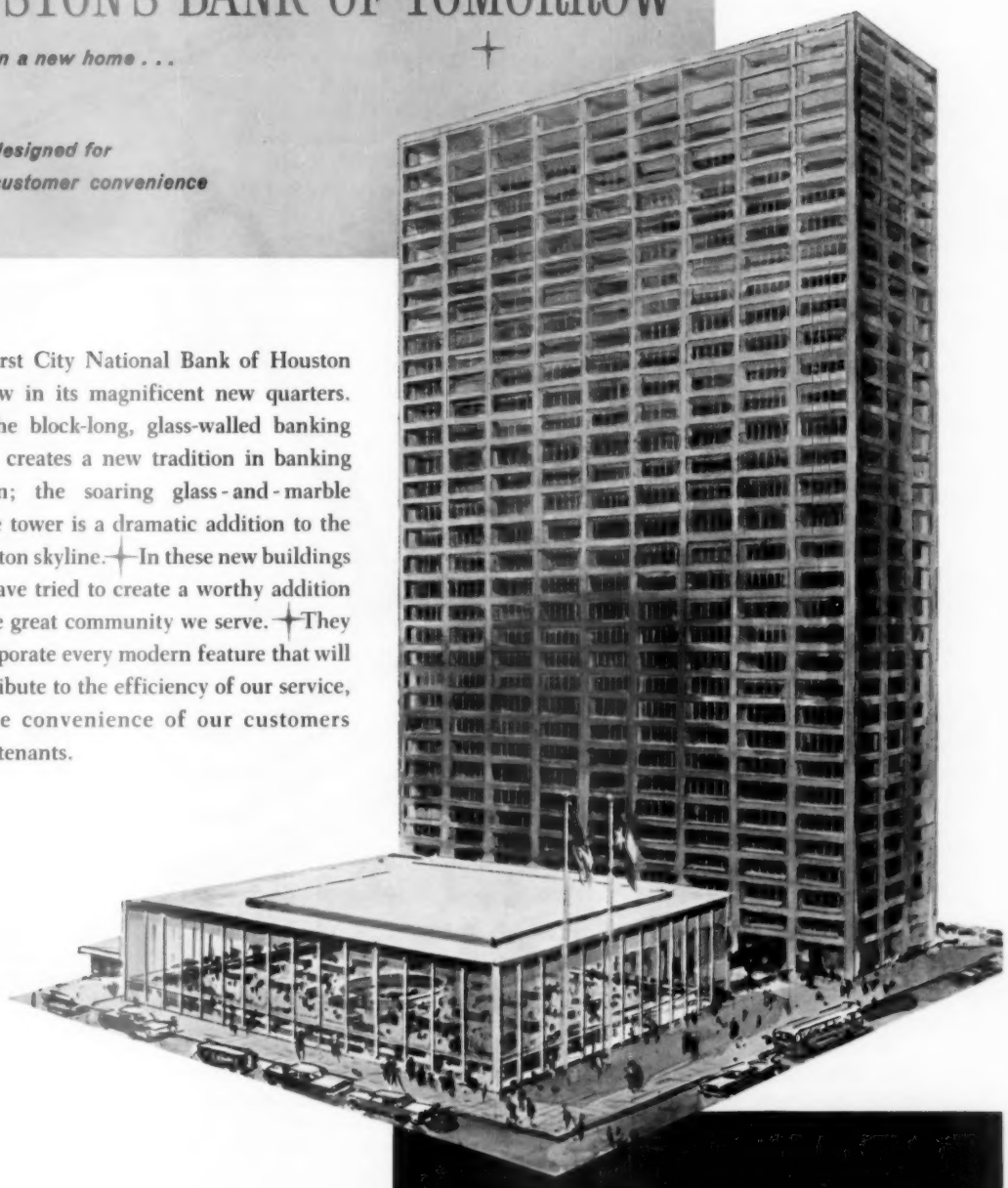

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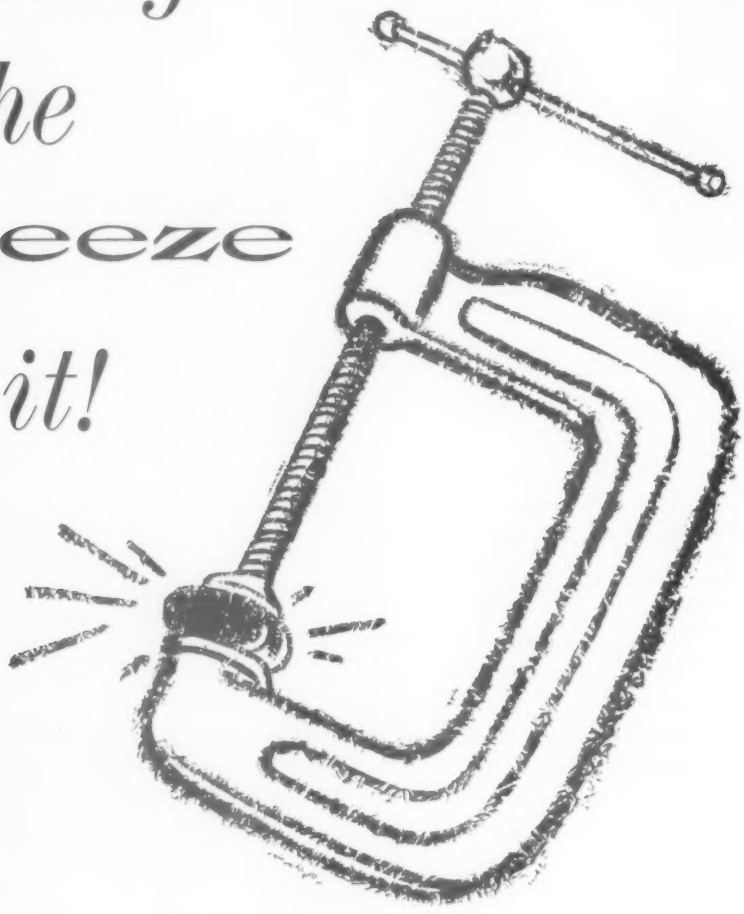

The products of the petrochemical industry represent one of the great industrial achievements of our time. The polyethylene bag that protected the shirt you put on this morning is a good example. It was made from a refining by-product known as "off-gas," light ends from the refining process.

The petrochemical industry processes oil and gas hydrocarbons into raw materials for fibers, drugs, chemicals and plastics. Petro-chemistry transforms gas liquids from field processing, refinery light ends, "off-gas" and many other petroleum by-products into thousands of wondrous new materials. In our free enterprise climate the petroleum industry invests millions of dollars annually in research and development to put the squeeze to oil and gas that constantly widens the horizon of end uses for these hydrocarbons.

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6102

50 years ago

March 2, 1911

Union Oil Building Co. is incorporated as a $1,000,000 organization to erect a modern fireproof 11-story office building in Los Angeles to house Union Oil Co. and its subsidiaries. The building, to be completed early in 1912, will be known as the Union Oil building.

The new Vinton boom field in southwestern Louisiana dominated oil news during the week with its gusher wells and drilling activity. Gulf Refining Co. leads with daily production of 11,000 bbl. from eight wells; Producers Oil Co. has 5,500 bbl. from two wells, and Vinton Petroleum Co. 3,500 bbl. from three wells. Twenty-one wells are drilling with rigs going up for ten more.

T. N. Barnsdall (Barnsdall Oil Co.) takes option to purchase the controlling interest in Wichita Natural Gas Co., capitalized at $3,000,000.

25 years ago

February 27, 1936

Pipeline outlet for Michigan oil fields is provided as Simrall Pipe Line Co. and Standard Oil Co. of Ohio start crude through newly completed, jointly owned 140-mile line to Standard's refinery at Toledo. Initial runs of 7,000 bbl. daily can be increased to 12,000 bbl. daily with present pumping equipment.

Humble Oil & Refining Co. brings in its discovery well of Amelia field at southwest edge of Beaumont, Tex., with potential flow of 483 bbl. of 28.5°-gravity oil daily from Frio sand at depth of 6,777 ft. New well, 1 Langham, indicates major Gulf Coast field less than 5 miles from Spindletop field, at southeast edge of city.

10 years ago

March 1, 1951

Castaic Junction area, 35 miles north of Los Angeles, becomes hot spot in California following two new discoveries—Honor Rancho field, 1¼ miles north, and Castaic Junction field, 1½ miles south. Three deep wildcats are drilling within a radius of 3 miles. Five more are drilling within a radius of 7 miles. Ten additional rigs are running in close-by fields.

Arkansas governor signs state's new field-unitization law.

Standard-Vacuum Oil Co. reveals plans for building a refinery in Union of South Africa. New plant is to be first in country. It will operate on imported crude with a daily charging capacity of 10,000 bbl.

JOURNALLY SPEAKING

Dung Ho

IN A COUPLE of weeks the Federal Power Commission is going to go through another one of its many exercises in futility.

Out at Midland, Tex., it is going to hold a gigantic, circus-tent, free-for-all conference to get the views of everybody in the world as to how it might go about finding the proper price for natural gas produced in the Permian basin.

Even before we got the letter from South Africa we figured the conference would be an exercise in futility because, after 6 years of trying, FPC has never been able to say what kind of information it would like to have to determine the proper price for gas anywhere, and we doubt that either the producer spokesmen or the consumer spokesmen will come up with any unbiased, objective, constructive suggestions.

But the letter from South Africa clinched it.

A man down in the Transvaal has figured out a way to make the price of natural gas an academic question. In fact, he will make the whole natural-gas industry obsolete.

He has developed a system, he says, for generating large quantities of natural gas by decomposing animal dung anaerobically. It does this without detracting from the fertilizing value of the dung itself, he says.

He built a plant himself and it has been running a converted diesel engine 24 hours a day for 2 years at a saving of £2,000 in fuel bills, he says.

Now there's the answer to the gas distributors' prayer. They can build their own dung-gas plants and tell the greedy producers and the monopolistic pipelines to go jump in the lake. When they have their own gas supply, the cost of drilling a 15,000-ft. wildcat in West Texas will have no more bearing on the case than the price of petrified noodles in Egypt.

As a matter of fact, some distributors are now spending a lot of dough in research on making their own gas from coal or shale in order to be free from the pesky producers. They haven't had much luck so far, but now the Transvaal experimenter brings dung into their lives.

But even if the gas business goes to the dung heap, we'll bet a cookie that the old reliable FPC and its hard corps of staff inquisitors will keep right on with their attempts to protect the consumer with formulas for allocating costs.

If, as the man says, anaerobically produced methane does not detract from the fertilizing value of the dung, FPC will argue that the entire cost of the process should be charged against the fertilizer and no part of it allocated to gas. In other words, the gas will cost nothing.

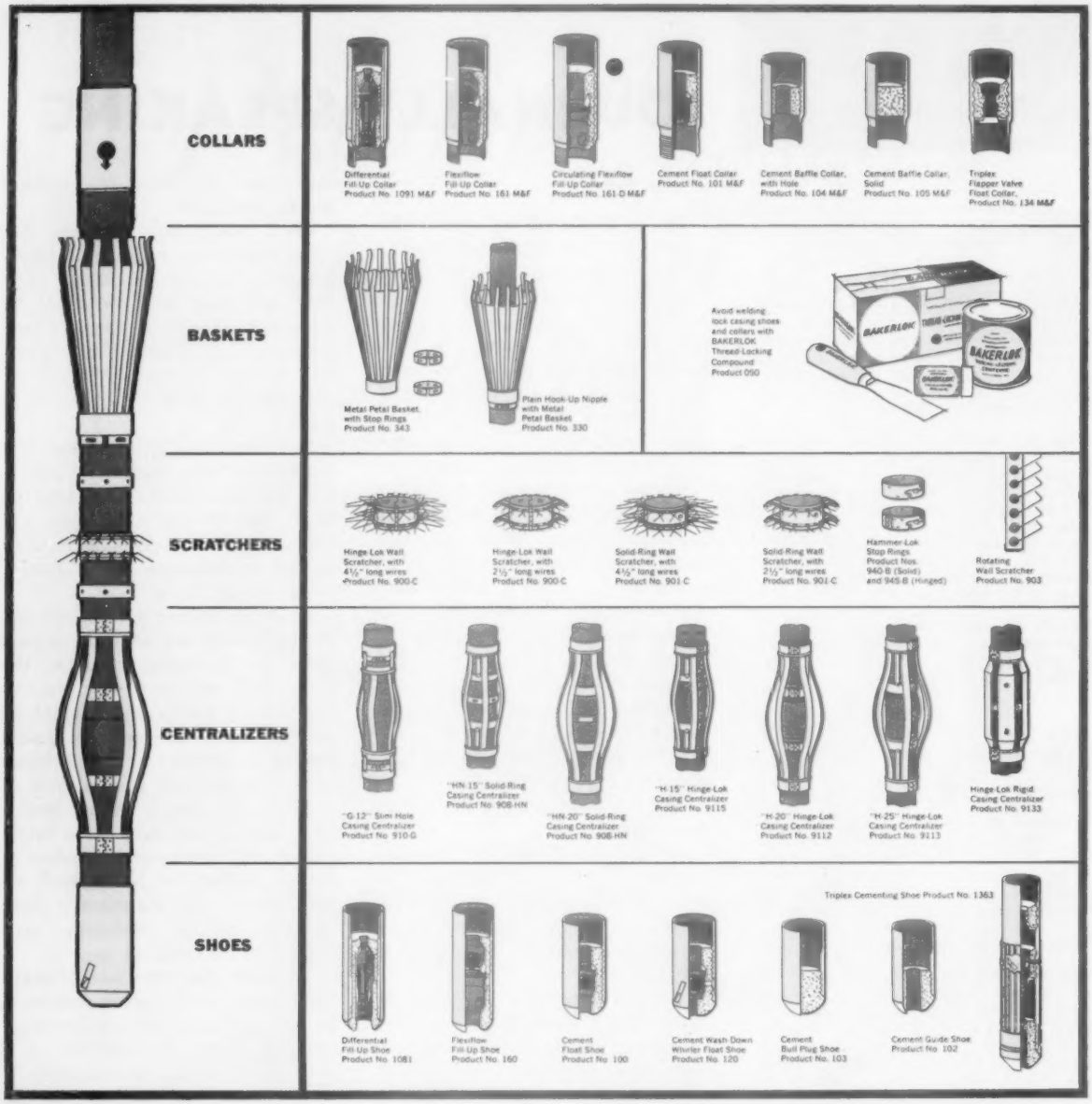
We predict that it will go further and contend that dung is an unexpected and unwanted byproduct of the production of beef, wool, or race horses, and therefore it costs nothing and no production cost should be allocated to gas.

At least that's the line of argument being used against producers of gas by the present, or predung, method. They are told that they discovered their gas accidentally while looking for oil and that the entire cost of finding it should be, and probably already has been, allocated to the oil end of their business, and therefore the producers are entitled to get next to nothing when they sell their gas.

Perhaps somebody should write that man in South Africa and find out what cost-of-service rate-base allocation formula he used to arrive at a saving of £2,000 in the fuel bill for his dung-gas engine.

And if you think this is just a lot of dung, well, there are those who think that that's what the whole FPC procedure adds up to.

—Henry D. Ralph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Good primary cementing equipment makes sense

THERE ARE TWO WAYS to buy primary cementing equipment—by quality and by price. Both are important.

Still, some operators don't shop for quality. They feel that primary cementing is a more or less routine operation. So any shoes, collars, centralizers, scratchers, baskets are good enough.

IN OUR OPINION (and plenty of operators agree), primary cementing is never routine. You've got just one chance to get a good primary cement job. So it makes plain good sense to invest in the most advanced equipment you can get.

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Resid controls: Is the game worth the candle?

PERHAPS it would be smart politics for the domestic oil industry to interpose no opposition to current proposals to remove quota controls from imports of residual fuel oil.

At first blush this suggestion may be alarming to those who look on any oil imports as injurious, or who fear that a weakening of controls on resid would be used by the international companies or others as an entering wedge to gut the rest of the imports-control plan.

But study would demonstrate that the over-all economic loss to the domestic producing and refining industry would be quite small, while the political gains could be very substantial.

RESID IMPORT CONTROLS are the subject of a lot of political rhubarb— have been since they were imposed and will be as long as they continue. Domestic oil is an innocent bystander caught in the cross-fire between coal producers and New England consumers.

Consumers' spokesmen don't distinguish between industrial fuel oil and other petroleum products. Their squawks against resid controls tend to become attacks on the whole control system.

So if the domestic industry would favor ending government interference in the resid business it would have much firmer ground to support the much more important—and much more defensible—limitations on imports of crude and of other refined products.

Foreign resid has impact only on the North Atlantic seaboard. Its low price has some, but not a huge, effect on the total product realization of the relatively few Gulf and East Coast refineries competing with foreign resid. And this reflects back on the market for only an extremely small volume of low-gravity Gulf Coast crude.

Resid sells for less than the price of U. S. crude oil used to make it, and a price attractive to U. S. refiners would price resid out of the market. Therefore most refiners consider resid an unwanted byproduct and make as little as their equipment permits, regardless of the import volume.

Two years of resid controls have not had appreciable effects on demand, prices, import volume, or domestic output of resid. The only tangible results are an unsolvable administrative headache and an eternal squabble among importers, dealers, consumers, and coal men.

THERE SHOULD BE SAFEGUARDS if controls are lifted. Resid should be imported only for boiler fuel and not for reprocessing as crude. Resid imports should be excluded from the demand base in calculating crude imports, and deducted, at least in part, from crude-import quotas.

In short, resid imports are a very special situation, with little bearing on the rest of the oil business. If the domestic industry would keep aloof from that hassle it might gain support for the rest—the really vital parts—of the import-controls system.

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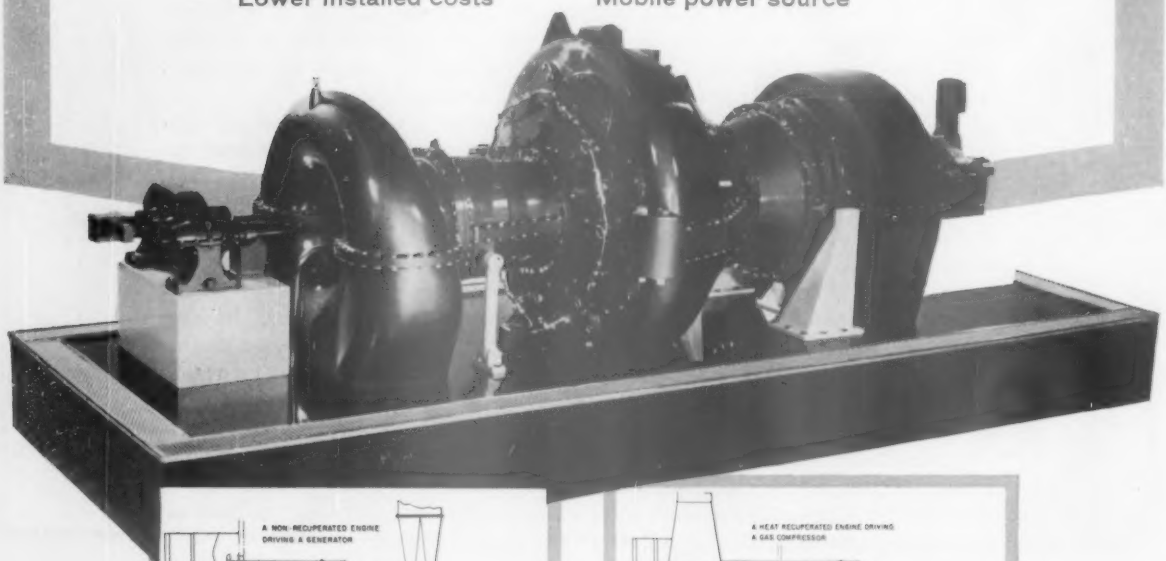

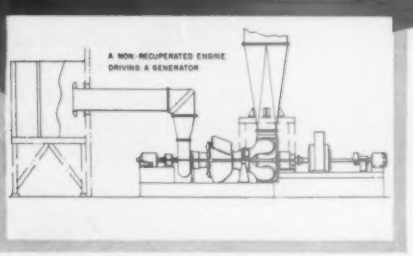

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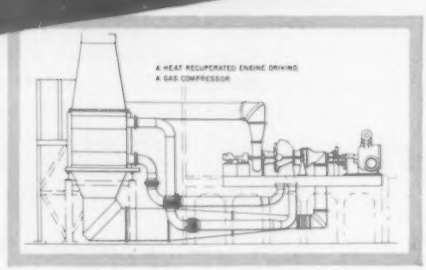

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Government Moves Quickly Into Oil

• New policy on residual-fuel imports will come soon, Udall says, to be followed closely by a new look at crude and product imports. In the meantime, Government will examine heating-oil price hikes and "tie-in" product sales.

THE OIL industry was on notice last week that the Government will be looking closely over its shoulder as it goes about its daily business.

In a 14-hour marathon hearing on residual fuel-oil imports, the industry was told that:

... A quick decision can be expected on the nation's policy on residual-fuel controls, and it may be made by President John F. Kennedy, himself.

... A new look at crude and product imports may follow quickly on the heels of the resid decision.

... The administration "is very deeply concerned" by recent price increases for heating oil on the East Coast. It does not plan to "stand by and see excessive and inflationary things of this nature in regard to something as basic as fuel."

... The Government may "crack down" on companies which require a buyer to take a quantity of No. 2 fuel oil, for example, in order to get a cargo of residual fuel.

The hearing, to gather testimony on the residual-fuel control program, lasted from 9:30 a.m. until midnight. Interior Secretary Stewart L. Udall showed the durability of the new administration by presiding until 10 p. m.

Fifty witnesses appeared, including 15 from the House or Senate appearing on behalf of oil consumers and coal interests.

Fuel-oil prices . . . Udall took time out of the hearing to scold the industry for raising heating-oil prices.

The President had called him, he said, after reading of sharp increases in price. "This is in a period of recession," he said. "Many people are jobless. Yet, their homes have to be heated, and the President is very much concerned about it."

"If all the basic commodities went up 10 or 12%, we would have a severe inflation problem," he commented.

Later he asked Morgan Davis, president of Humble Oil & Refining Co., for his views on the No. 2 fuel-oil price increases.

Davis said the fluctuations in price are "entirely in line with supply fluctuations of the past few years . . . I don't believe that you will find anything unusual in the current situation."

"A little warm weather," Davis said, "will have a dramatic effect on the price of No. 2 fuel oil."

Late last week Udall told The Oil and Gas Journal he is checking with the Department of Justice, Federal Trade Commission, and the Office of Civil and Defense Mobilization regarding the price increases. He hinted that the inquiry could be ended if prices dropped.

Decontrol broached . . . Bulk of the testimony was directed at removing all restrictions from imports of residual.

A representative of Atlantic Refining Co. actually filed a petition with OCDM asking an investigation to determine whether the curbs are essential to national security.

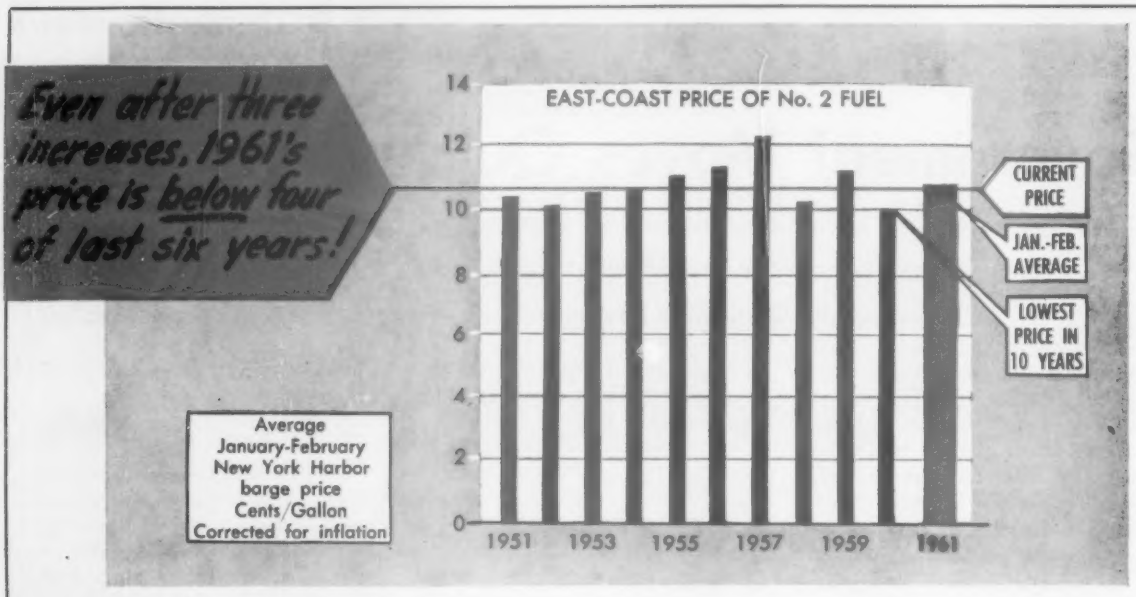
New England lawmakers and some major oil companies and independent refiners teamed up to criticize the control program.

The New Englanders complained of potential fuel shortages brought on by controls. They also complained of higher prices of fuel and of electrical power, which in some cases is pegged to fuel-oil prices.

Humble's Davis told the hearing that restrictions are not required for national security and should be removed.

"They do not benefit the domestic oil industry," he said. "They will not resolve the basic unemployment problem in the coal industry. They will continue to have adverse effects on consumers of residual fuel

BEFORE THE HEARING: Rep. Walter Rogers (D.-Tex.) is greeted by Interior Secretary Stewart Udall. Next to Udall is John M. Kelly, assistant secretary for minerals and, at right, Rep. Carl Albert (D.-Okla.), Democratic whip in the House.



Investigators Will Find Fuel-Oil Prices Reasonable

WHEN the Government investigates recent price increases for heating oil on the East Coast, this is what it will find:

While prices are higher than last year, they aren't high by past standards. It just so happens that last year's price was unusually low, actually the lowest in 10 years.

The chart clearly shows that trend in No. 2 prices.

To avoid confusion in reading the chart, keep in mind that:

. . . It is expressed in 1960 dollars to filter out the effects of inflation. Actual prices were somewhat lower.

. . . Barge prices in New York Harbor are used. They are basic and vary less than retail prices.

. . . Bars on the chart represent average price for January and February, the coldest months and usually the period of highest price.

On this basis, the price of 9.97 cents per gallon for 1960 is the lowest since 1951. Even on an uncorrected basis, 1960's price of 9.97 cents is the lowest since 1955 when the 2-month uncorrected average was 9.95 cents.

Current barge price is 10.90 cents, but the January-February average is 10.43 cents, or 10.39 cents expressed in 1960 dollars. That puts the 1961 average on the low side—7 years of the last 10 have been higher.

There have been three major raises in New York Harbor barge prices of No. 2 fuel this season.

The price was a subnormal 9.65 cents late in December. It was increased ½ cent the first week of January to attract supplies from the Gulf Coast.

In the fourth week of January, a ¼-cent raise was posted, putting the price at 10.40 cents. A third raise of ½ cent came in the sixth week of the year. Reasons for the last two increases were higher prices on the Gulf and a sudden spurt in tanker rates.

oil, such as limiting their freedom of choice and creating uncertainty as to supply. They are detrimental to our relationships with friendly foreign governments."

Case for control . . . Coal representatives sided with oil-state lawmakers and producers in arguing for a tight control program.

Coal men said they had been "shocked and astounded" by the February 17 order permitting an additional 100,000 bbl. daily in resid imports during the first quarter.

And Rep. Carl Albert (D.-Okla.), majority whip in the House, warned against any over-all change in the control program. He said oil is a depressed industry, with production down and exploration at a standstill.

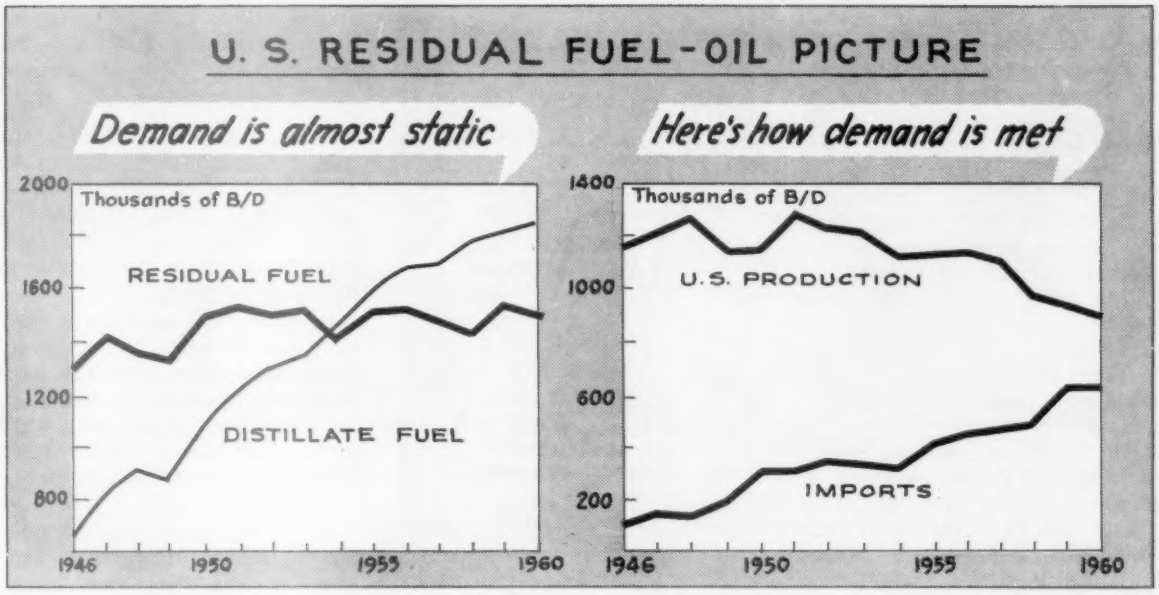
Aid for terminals . . . Udall showed much interest in a proposal by Otis Ellis, spokesman for oil jobbers.

Ellis urged that the present program be scrapped for one that would give the terminal operator an even better break than he gets under an amendment which was proposed by the Eisenhower administration.

It provided for quotas on the basis of terminal inputs as well as a prior history of imports.

Ellis suggested the resid program be put on a 6-month basis and that totals be based on estimated demand. This total would be decided on the basis of oil actually purchased and received in a recent base period.

Udall said a decision on resid imports would be made by persons in OCDM, the Interior Department, and, perhaps, by the President. He promised quick action.



Would Unlimited Resid Imports Hurt?

• Theoretically, they would eat into the market for U. S. crude. Actually, few refiners want to make heavy fuel, since its value is less than the raw material. Coal men and gas producers would be most affected.

REMOVAL of controls on imports of residual fuel oil wouldn't hurt the domestic oil industry enough to notice.

Coal would be affected and also natural gas—assuming that unrestricted imports lowered the resid price appreciably.

In theory, imported residual reduces the potential market for domestic crude oil, and a reduction in resid price lowers the over-all realization of refiners.

But actually, neither the quantity likely to be imported without restrictions nor the price it is apt to bring would have much effect on either producers or refiners.

The explanation lies in the peculiar nature of residual fuel oil.

. . . Its market is declining. U. S. demand hasn't increased a barrel in 10 years, though consumption of other petroleum products has marched steadily upward.

. . . It sells for less than the cost of its raw material in the U. S., and has for many years. So domestic refiners progressively make less and less of it.

. . . A price high enough to induce refiners to make more would simply drive consumers to coal and gas—unless those fuels were denied them.

. . . Modern refining technology is fast making resid too valuable to burn. It can be upgraded into products that bring higher prices.

Resid has only one use—as an industrial fuel to generate steam or electricity. There it is in direct competition with coal and gas. It is unsuited for small burners or residential heating.

The change . . . The market for resid reached its top soon after World War II.

Then railroads converted from steam to diesels, and natural gas was piped to eastern industrial areas, and much of it went for boiler fuel. Since then resid demand has been generally declining (see chart).

Resid sells for something like $1 a barrel less than the cost of the crude from which it is made. So some refiners make none at all, and nearly all are moving to reduce their resid yields to the minimum by converting resid into coke, distillate fuel, or gasoline. Some still make resid at the low price rather than install expensive new equipment.

The boiler-fuel market is highly competitive. Some big users are equipped to shift from resid to coal or gas with every change in the price relationships. A lower price would expand the market, but U. S. refiners are already selling resid below cost. A higher price would contract the market by driving customers to competing fuels.

Declining yield . . . Years ago some refineries sold as much as 50% of their crude as residual fuel oil.

In the decade before World War II the average resid yield of U. S. refineries was 25%. Even before demand began to slump, new refining processes, developed during the war, operated to reduce resid output.

From a yield of 24.9% in 1946, resid output dropped to 20.2% of crude run in 1950, to 15.3% in 1955, and to 12.9% in 1958. Early in 1959 a limit was put on resid imports. This should have made the market more attractive to U. S. refiners. But that year resid yield

dropped to 11.8%. And in 1960 the yield was only 11.1%.

Residual imports enter this country in much volume only along the Atlantic Seaboard. The stuff is too heavy to move through pipelines, so the impact of imports is not felt very far inland. Therefore a breakdown of 1960 residual yields by refining areas—shown in accompanying table—is enlightening.

The striking thing is that areas not touched by imported resid had resid yields far below the national average, while East Coast refiners made more resid than the national average.

The chart on this page shows the volume of residual produced by refineries on the Gulf and East Coasts—the areas that supply resid to the Atlantic Seaboard in competition with imports.

Note how the volume has dropped steadily since 1956, both before and after import controls. The effect of controls doesn't show up at all.

Nearly three-fifths of the resid used in the U. S. is used by industries and utilities to generate steam or electricity, and that market has been declining by 1.3% annually for the past 5 years.

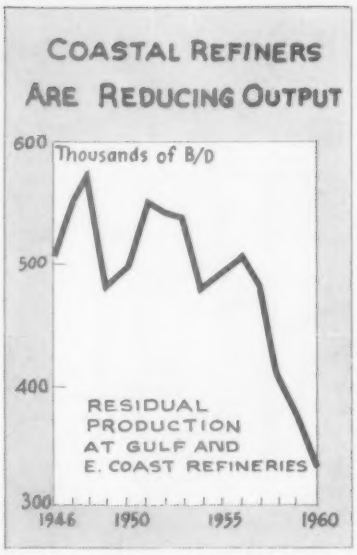
Another fifth is used in transportation, and that market is declining 2.8% a year, since steamboats are about all that is left of it. The other fifth is used in space heating and this has increased 6.6% annually.

But the heating market is precarious because a great many of these big consumers are equipped to switch from resid to either coal or gas overnight if the price relationships change.

What effects? . . . Granting that refiners generally may be content to see their resid market dwindle away, it can be argued that producers suffer because the demand for crude oil is much less than it would be if imported resid, natural gas, and coal didn't take so much of the boiler-fuel market.

However, unless something should happen to push up gas and coal prices steeply, refiners would not want to make much more resid even if none were imported.

It is also argued that refiners' over-all realization is reduced by the extent to which imports lower resid prices, and this has the effect of keeping down the price refiners can afford to pay for their crude.



On the other hand, if refiners can, by new techniques, turn resid into more profitable products their realization will go up even more than from an increased resid price that might be caused by smaller imports.

If it were not for large quantities of natural gas priced low enough to use as boiler fuel on the Atlantic Seaboard, restrictions on imports of residual might increase both the demand and the price for U. S.-made resid.

As it is, it appears that the controls of the past 2 years have had no appreciable effect on the domestic oil industry, and that removal of them would have no appreciable effect either.

The march of technology probably will keep right on drying up the supply of domestic resid—and probably much faster than demand for it declines.

Processing trends . . . During the past 5 years refiners throughout the U. S. have added new capacity for converting residuals to gasoline and middle distillates at a rate comparable with the national gains in basic crude capacity.

Significantly, East Coast refiners have boosted their capacity for residuum conversion at a much more rapid rate than those elsewhere. In 1956 only one coking unit existed on the East Coast and almost all residual conversion was done by viscosity breaking.

In the meantime, several coking and visbreaking units have been added, raising East Coast conversion capacity from 6.2% of crude capacity in 1956 to 10.8% today. This growing interest in converting low-valued heavy fuel to distillates has taken place in the heart of the major consumption area for residual fuel.

Refiners have chosen to let imports take over a larger share of the heavy-fuel market while they improved their realization.

The same trend is noted in the Gulf Coast, which has ready access to East Coast markets. There the trend toward coking is more recent. Currently five delayed cokers are being added to raise the Gulf Coast to a level of residuum conversion equal to 8.1% of crude capacity.

The Pacific Coast has historically been heavy-coking country, because of the preponderance of heavy crudes produced in California. But the rate of residuum conversion is dropping there, because of the introduction of Four Corners, Canadian, and other foreign crudes of lighter gravity.

Thus we see refiners with access to the East Coast residual market, backing away from it by adding more capacity for conversion to lighter products.

This has taken place during the period in which residual import controls were introduced. The prospect of a relatively more protected market has had no effect whatever on any of the long-range processing plans of refiners in various sections of the country.

Today's Resid Yields

Refining region—	% residual yield
East Coast	12.5
Appalachian 1	10.8
Appalachian 2	12.0
Ill., Ind., Ky.	11.1
Minn., Wis., Dak.	14.3
Okla., Kans., Mo.	3.2
Inland Texas	6.5
Texas Gulf	7.6
La. Gulf	6.9
N. La. and Ark.	5.9
New Mexico	10.7
Other Rocky Mt.	10.9
West Coast	23.5
Total U. S.	11.1

Rayburn May Name Fuels-Study Committee

- **Latest proposal drops Senate participation, lets House speaker name all 15 committee members.**

CONGRESS moves closer to a fuels study this week with a new plan to have the job done by a House committee of 15 instead of a House-Senate committee of 16.

The new plan, drawn up apparently with the approval of House Speaker Sam Rayburn was laid before the House rules committee February 23.

Speedy approval by the committee and then by the House was expected.

The measure represents the third version of a fuels study resolution laid before Congress this year. Each change pleased oil and gas more and coal less.

The latest plan would see Rayburn name members of the committee. Oil and gas have confidence in Rayburn's impartiality and fairness.

The new version calls for a committee to study all aspects of all fuels and reserves and make legislative recommendations. Deadline for the final report is January 2, 1962. No money is provided in the resolution, leaving this to be added later.

Rep. Wayne Aspinali (D.-Colo.), chairman of the House interior committee put in all three resolutions. Hearings were held February 21, with Rep. Walter Rogers (D.-Tex.) speaking against it.

He said if coal wants end-use controls it should ask for them directly. Nearly 20 House members from coal states endorsed the resolution.

About 55 senators backing a measure for a House-Senate fuels committee may push ahead with their measure, change it to a Senate committee study, or drop the whole idea.

W. E. Mueller, president of the Independent Natural Gas Association of America, meanwhile promised "fullest cooperation in any objective study" by either Congress or the administration.

He wrote a letter to President Kennedy saying he wants a "fair and impartial" study protecting the consumer's "right to choose" and avoiding "increased rates resulting from competitive restrictions."

Kennedy Outlines Resources Plans

PRESIDENT Kennedy called for more natural-resources planning but skipped any reference to a national fuels policy in his natural resources message to Congress.

For long-range planning he plans to create a presidential advisory committee on natural resources under the Council of Economic Advisers which will represent federal agencies in the field, he said.

He plans to bolster the national-needs work of the council and to have the National Academy of Sciences study the state of research on natural resources.

He proposed "a special unit" of the U. S. Public Health Service on water and air pollution and promised "a national program for oceanography" in next year's budget. He said coastal oceans hold 20% of our reserves of crude oil and natural gas.

Bill Would Raise Texas Output

TWO Texas legislators plan to introduce a bill which would direct the Texas Railroad Commission to set crude-oil allowables no lower than 14 producing days per month.

Allowable patterns in Texas have run much lower than this for several years. They have not exceeded 10 producing days for nearly 2 years.

The legislators are Tom Andrews of Aransas Pass and George Cook of Odessa. They claim that low allowables have virtually "wiped out some businesses connected with oil drilling and servicing."

"We believe," they said, "that the railroad commission was created to conserve our natural resources and not to control the marketing of oil and gas. Due to the shortsightedness of the commission, Texas oil exploration and development has been retarded and foreign oil has been allowed to capture Texas oil and gas markets."

William J. Murray, Jr., chairman of the commission, took a dim view of the proposed bill when advised of it.

"If they can create the demand, we'd be thrilled to raise production to meet it," he said.

Houston Corp. Looking for Production

THE HOUSTON Corp. has decided, like other long-lines gas-transmission companies, to go into the oil and gas production business.

The owner of the only Texas-to-Florida gas line announced last week it has organized a subsidiary, Coastal Production Co., to acquire oil and gas properties and conduct an exploration program.

H. L. Wilhite, executive vice president of the new firm, said Coastal Production will start from scratch and be a small-scale operation at first. While it will be interested in gas production to feed its gas line, the company will be "on its own" and look for any production it can find. It will operate mainly in Texas and Louisiana.

Operating headquarters will be in Houston, the home of Coastal Transmission Corp., one of Houston Corp.'s two subsidiaries which operate the gas line.

W. J. Bowen, St. Petersburg, Fla., president of Houston Corp., is also president of Coastal Production.

The movement into oil and gas production by Houston Corp. follows a trend among other transmission companies to diversify their operations to include nonregulated portions of the oil industry.

Phillips' Vice President Lyon
. . . at odds with an old tradition.

Says Lyon:

"The tank-wagon price is an antiquated method of pricing. The pricing of gasoline has, of necessity, to be worked out as a fair one between the laid-in cost and the retailer's sale price."

"I don't believe in price wars. They destroy, rather than create. The public doesn't gain from one. Such wars are destructive to the community as a whole; they reduce the buying power of local business and, in the aggregate, no one profits."

"To subsidize a jobber or dealer out of the refiner's pocket only encourages the unscrupulous operator who wants to profit through destroying rather than creating."

"Chief reason for retail pricing problems is this: The supplier has been trying to hold a protective umbrella of subsidies over prices of products at retail. This has been a miserable failure. Retail pricing problems have created a cord of trouble that has wound its way around every segment of the industry."

How Phillips Looks at Gasoline Pricing

• It hasn't said so officially, but it may soon extend its experimental policy of granting no aid to jobbers in price wars. The reason: Tests in Oklahoma and Kansas show that refusal to guarantee profits makes healthier marketing.

PHILLIPS Petroleum Co. is abandoning a time-honored policy of guaranteed price margins to its jobbers and dealers. The move is aimed at curtailing gasoline price wars.

The new marketing strategy stemmed from an 8-month experiment in Kansas and Oklahoma without the guaranteed margins. It may eventually spread to all 37 states where Phillips markets.

E. H. Lyon, Phillips vice president for sales, says the experiment proved that dealers can fight price wars very effectively on their own without the guarantee.

The assured margin on gasoline originally was devised as an emergency subsidy to protect jobbers and dealers from going bankrupt during cut-throat, localized price struggles forced on them by competitors.

Lyon terms the subsidy a "miserable failure." It had no lasting benefits and, in fact, nurtured and encouraged price wars instead of lessening them, he says.

Lyon points out that Phillips has supported its dealers with guaranteed margins for most of the 33 years the company has been a marketer, and it didn't make the change hastily.

"Our plan was not born of mere expediency for a small area but is part of a larger pricing philosophy which is crystallizing out of years of observation.

"The philosophy of price protection and guaranteed margins in a system of free enterprise is wrong."

Phillips plan . . . The new Phillips policy got its first test in Oklahoma in July, 1960.

"It worked so well we extended it into most of Kansas in November last year," Lyon said.

In Oklahoma, Phillips established a flat wholesale price for the entire state. In computing the price of gasoline delivered to the jobber, average differences in freight and transportation factors were considered.

"We are concerned with only one level of price—that of the branded jobber," says Lyon.

"We no longer fix tank wagon prices and sell to our jobbers on a given margin below that figure. We no longer protect the jobber to allow him to subsidize his dealers.

"The price is subject to change from day to day depending on marketing conditions in a jobber's territory. That's why we make the basic price the one that is in effect on the day of delivery."

The plan has one other important aspect: The wholesale price is applied to a state or region that is recognized as a distinct marketing area. Thus, similar economic forces are in play, and a single wholesale price will work.

The results . . . Lyon recently told members of the Kansas Oil Men's Association how effectively the single wholesale-price plan had worked.

Before the new pricing plan, Phillips was paying heavily to subsidize price wars. Some jobbers were willing in emergencies to operate at reduced margins; but in most cases Phillips, as the supplier, had to bear the brunt of price war losses.

Operations in the test areas, however, showed more stability, fewer price wars. Lyon said Phillips "has retained and increased the sort of

business really worthwhile to us, and to our customers."

"Our jobbers are pleased at the visible stability. The dealers have gained, and their communities have benefited. You can't name another industry where the supplier sends along a check if a given margin of profit is not made. We have concluded it is time for each segment of marketing to stand on its own feet."

Price reductions in a price war solve nothing, Lyons insists. He cites this example of how Phillips' refusal to guarantee a profit worked in an Oklahoma community:

"Independents, engaged in a private squabble to wrest gallonage from each other, progressively dropped prices well below a reasonable differential. Prices reached 26.9 cents a gallon with major brand dealers continuing to sell at 32.9 and 33.9 cents a gallon.

"For 3 or 4 days the battle remained in hands of the independents. The Phillips jobber did not ask for price allowances. Although distressed at the potential loss of gallonage, he told us he didn't really want to ask for price protection.

"About 30 dealers in this community closed their doors, refusing to sell at ruinous prices. They were openly bitter at ability of independents to drop prices and survive.

"Service stations which had closed at noon Thursday were beginning to reopen Monday, with equitable price levels being posted by independents and major-brand dealers alike. Since that time, no abnormal situations have appeared there."

More change ahead . . . Lyon believes the two-state experiment has been successful, has been an eye-opener, and has been greeted enthusiastically by supplier, refiner, jobber, and retail dealer alike.

"To stave off being suffocated by the cost-price squeeze, oil companies now are lowering costs and increasing efficiencies. The jobber and dealer are going to have to take similar steps to meet price competition.

"Some marketers already have shown that by efficient operation, they can reduce prices, pass results on to the consumer, and still make a satisfactory margin of profit."

watching WASHINGTON

Clyde La Motte

(Editor's note—Clyde La Motte, our Washington editor, is currently "Watching Washington" through his bedroom window after having been released recently from a hospital following an operation. His wife reports she knew he was well on the road to recovery when he sat up in bed and began yelling for his typewriter. The results follow.)

• You may not agree, but this is the way it looks here . . .

Having had ample time lately to do some light and heavy thinking on various subjects, it occurs to me that:

. . . **If the API** is ever going to make a stronger move in Washington, the time to do it is right now while the administration is still shaping up its oil views and policies.

. . . **Clocks run slower** in hospitals than any place else.

. . . **A nail was never hit** squarer on the head than by The Oil and Gas Journal's February 13 editorial (p. 43) calling attention to oil's need to employ a new set of tactics in Washington now.

. . . **A patient (male)** is beginning to improve when he starts noticing that his nurse is pretty. About that time, he gets sent home.

. . . **Interior Secretary Stewart L. Udall** is already showing more personal interest and active participation in oil problems than any Interior secretary in years.

. . . **The quickest way to insult** a surgeon is to ask him if he works at a meat market on his days off.

. . . **Battery manufacturers** and/or oil companies need to do more to educate the motorist on how to help prevent battery failure in cold weather. A citizen can be understandably bitter if his battery quits while he is trying to get home through a blinding snowstorm.

. . . **Hospitals** sometimes get so engrossed with the problems of surgeons, interns, nurses, staff, etc., that they tend to lose sight of their patients. Oil could learn a lesson from this: Never forget that the consuming public's interest must come first.

. . . **Producers** who have been objecting to the area-pricing approach to natural gas regulation may long for that solution after short exposures to the thinking of James M. Landis, the President's chief adviser on regulatory matters, and to the approach by the Landis-approved appointees to the Federal Power Commission.

. . . **You are getting well** when hospital food begins tasting awful. When you're really sick, the food has no taste at all, and you couldn't care less.

. . . **The first area-price hearing** will be a long, tedious affair. Seventy-eight interested parties, in addition to producers involved, have already asked to be heard at the pre-hearing conference scheduled to begin in Midland March 6. Seems that everybody and his dog wants to be heard. And nothing will be settled at the pre-hearing conference other than the ground rules for the hearing itself. No date has been set for that yet.

. . . **If you have a friend who is ailing,** don't overlook the therapeutic value of a visit, a phone call, flowers, a note, or a good corny get-well card. They are wonderful medicine. (This is my awkward way of saying thanks to the many thoughtful persons who have been so nice to me.)

. . . **Governmental control,** like an enema, may be necessary at times. But either is a heck of an unpleasant, undesirable way to get the job done.

Cement-Coated, Prefabricated Pipeline

• Field welding was not necessary. The crew installing the water-injection line averaged 3 minutes a section.

ENGINEERS of Union Oil Co. of California claim a major breakthrough in economy and installation speed for a small-inch pipeline.

The unusual pipeline supplies water to a secondary-recovery project operated by Union in Chaves County, near Lovington, N. M. Its installation has attracted attention of oil-company field men because of:

. . . Prefabrication.

The pipe was manufactured, lined with cement, and coated with mortar at the main plant of Southern Pipe Division of U. S. Industries, Inc., in Azusa, Calif. All fittings, laterals, and special joints also were fabricated there.

The line consists of 4.25 miles of 8⅝-in. electric-weld steel pipe in 38-ft. sections and 3,520 ft. of 4½-in. pipe in 40-ft. sections. Coating is spirally wound steel-reinforced mortar ½-in. thick. The cement mortar lining is 5/16-in. thick.

. . . Speed.

A five-man crew from C & G Oil Field Contractors of Lovington averaged 3 minutes per section in installing the line. They used a conventional ditching machine and a boom mounted on a flatbed truck.

. . . Economy.

Major savings were achieved through use of Southern Pipe's Pres-Seal "O" ring rubber gasket joints. These accurately formed field joints eliminated need for welding.

Field welding was not required for the special joints, laterals, and fittings. Field wrapping or coating was eliminated.

Simple routine . . . The crew followed a simple installation routine.

As the boom swung the pipe into position, one man placed the gasket on the spigot end.

Another man cleaned the spigot end. Then he applied a vegetable soap and internal grout. The soap eased entry of the spigot into the bell end of the section already installed. The internal grout sealed the liner.

When the spigot was inserted into the bell, a slight forward movement of the truck pulled the new section securely into position, and the watertight joint was completed. Another crewman then applied the external grout to seal the coating.

Despite the rough terrain, the installation required no special trenching or backfill. The rugged nature of the reinforced mortar coating protected the pipe sufficiently. The coating had withstood shipment over a thousand miles of rail with no special handling and had remained in the open through severe freezes without damage.

The line will provide water for injections in 10 wells at an initial rate of 10,000 bbl. daily with maximum pressure of 150 psi.

1 Sections of cement-coated, mortar-lined pipe have a nozzle at one end (right) and a bell at the other, making possible jointing on the right-of-way without welding.

Louisiana's New Wide-Spacing Bonus Plan Goes

LOUISIANA's new order giving higher allowables to widely spaced wells has gone into effect, and some producers are taking advantage of it.

The Louisiana Conservation Department put the order into effect for new fields. It decided against an earlier idea to make it retroactive to last May.

Effective March 1, a spacing pattern of 80 acres will be recognized in Opelousas field.

The wells will be assigned allowables which, on the average, will be 50% greater than allowables under the old formula. Only the depth factor was applied formerly.

The new-pool allowable formula was announced last November (OGJ, Nov. 21, 1960, p. 149).

A department spokesman said last week that while Commissioner James Gill had the authority to grant the retroactive allowable, he decided against it because of the danger that such a policy would throw extra production on the market.

Tidewater Oil Co. and other producers decided on the 80-acre spacing pattern for Opelousas field, which has 22 producing wells near the city of Opelousas in St. Landry Parish.

Wells which would have had allowables of 90 bbl. daily under the depth-bracket formula alone will now receive allowables averaging 135 bbl. daily. The amount for each well will vary according to the actual acreage it drains.

Bonuses granted . . . The first order granting extra allowables under the new formula covered one unit in the Tigre Lagoon field. The order took effect January 1. Spacing in the field averages 84 acres, and the allowable is 50% greater than it would have been under 40-acre spacing.

Another bonus allowable became effective February 1 when wells in

Cuts Costs

2 Jointing is simple. Two men of the five-man crew clean the nozzle end, install a rubber gasket, and apply soap for lubrication and a cushion when the nozzle is inserted into the bell end of a section already installed. An internal grout also is run to seal the liner.

3 Final steps are inserting the two ends, running an outside grout to seal the cement coating, and lowering the section into the ditch. Note the rocky terrain—no trench preparation nor special fill is required, providing another economy touch.

Into Gear

Bayou Segnette field, Jefferson Parish, were approved for 60-acre spacing.

The producers asked originally for 80 acres but scaled it down during development. With 60 acres, the wells will get an average allowable 25% higher than those on the basic 40-acre pattern.

A depth allowable under 40 acres would entitle producers to 90 bbl. daily, but the bonus for wider drilling gives them an average of 112.5 bbl.

Shell Oil Co. has requested 80-acre spacing for its offshore production in the Eugene Island Block 100 field. A hearing was held by the conservation department in January, and an order granting the 50% higher allowable is expected shortly. This would be the first for offshore Louisiana.

Use limited . . . A department spokesman says it is still too early to assess the full impact of the new formula on Louisiana production as a whole. Since the formula affects only new pools and since it won't be retroactive, its application will be limited.

The theory behind the order is that it should not increase production in a given field but simply reduce the number of wells which will be drilled to drain the field properly.

But in the long run Louisiana hopes it will result in greater production because the savings in drilling costs can be put to use in wildcatting.

Two developments are apparent from early experience with the order.

First, not all new pools will be developed on 80-acre patterns, even though this gives the maximum allowable. The economics of drilling may dictate smaller spacing.

Second, there is little likelihood that any pools will be developed on less than 40 acres if they come within the penalty rules of the order. The allowable is reduced proportionately for less than 40-acre drilling until it becomes zero for less than one acre.

PORTABLE vibrator, the energy source for a new seismic tool, is being shown by W. O. Heap, left, senior research engineer, and G. H. Westby, president of Seismograph Service Corp.

Vibroseis Hailed as Major Tool

EXPLORATION executives of several leading oil companies are evaluating a new exploration tool called the Vibroseis system. Its developers say it is a major development in geophysics.

Seismograph Service Corp. staged a demonstration of the system at its Tulsa headquarters and for the first time showed off the development to the industry.

The system was developed by Continental Oil Co. personnel. Seismograph Service will manufacture part of the equipment and holds foreign rights on the system.

Vibroseis is a surface vibrator system that generates controlled seismic waves for recording (OGJ, Feb. 13, p. 49).

It works like this: A vibrator mounted on the rear of a truck sends down seismic waves at predetermined frequencies on signals received by radio from the control truck.

An operator at the control truck uses a master control signal recorded from a magnetic tape. This is transmitted by radio to the vibrator or vibrators if several are used. The seismic waves are picked up by geophones and recorded. Later they are related with the signal actually introduced into the earth.

G. H. Westby, president of Seismograph Service, praised Vibroseis as a major development in geophysical exploration because of:

... **Better controls.** The geophysicist through Vibroseis' master control signal can introduce the frequency spectrum into the earth that is most applicable. Since the vibrators are identical, kept in phase, and are controlled by a master signal, the operator can use as many of them as needed to produce the desired energy.

... **Speed.** Rapid movement of exploration team across the area being tested is possible because of this ability to control input signal and use several vibrators simultaneously.

... **Better data.** Ability to correlate recorded signal with the signal introduced minimizes effects of stray noise and gives the geophysicist a clearer picture of the reflected energy. Recordings obtained by a field crew in a day's work can be correlated with the master input signal in less than 1 man day. This permits rapid processing of the field data.

... **Savings.** There are no shot holes to drill and no dynamite to set off, thus saving investment and operating costs for equipment, extra labor, and chance of blast damage. The equipment can be used in congested areas without fear of damage. In fact, Vibroseis for the first time has mapped the Los Angeles basin, including sections in the downtown area.

Westby stressed that flexibility of the Vibroseis system is one of its big assets. Since dynamite and shot holes are not required, exploration is possible in desert areas or where surface formations cause high drilling and explosive costs.

Westby did not disclose cost of the equipment or charges for the service but explained that in view of the speed and savings achieved for better seismic data the cost would be economical. Plans for use of the system in this country have not been clearly established yet. Seismograph Service expects to put one foreign crew to work soon for a major company in Libya.

Explosion, fire at Phillips' Borger plant kills nine

AN EXPLOSION and fire which broke out when a line ruptured at the Phillips Petroleum Co. refinery near Borger, Tex., last Wednesday killed nine men and injured another man seriously.

All nine of the men killed were in a construction shack. Flames shot across the shack and another nearby shack.

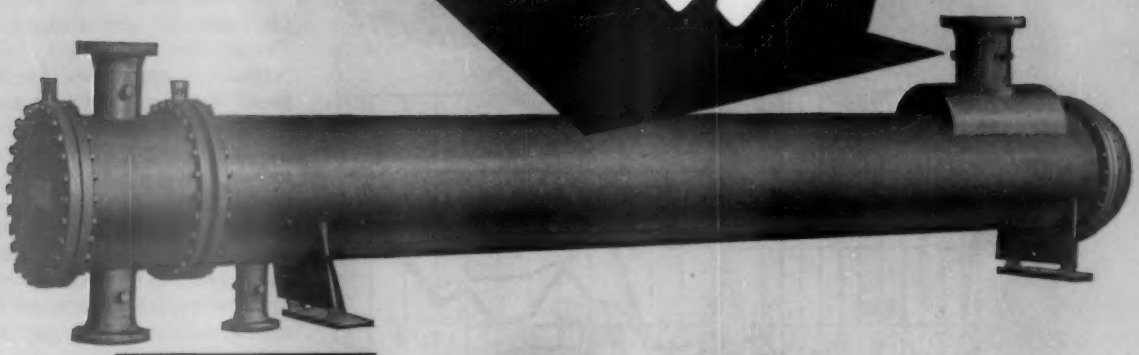
It was reported that the explosion followed a rupture in a line. A company disaster unit sealed the rupture and put out the fire in less than an hour.

Damage was light.

The victims were employes of Bowman-Chase Construction Co., Borger.

A pickup truck owned by the contractor was destroyed in the fire.

NEW



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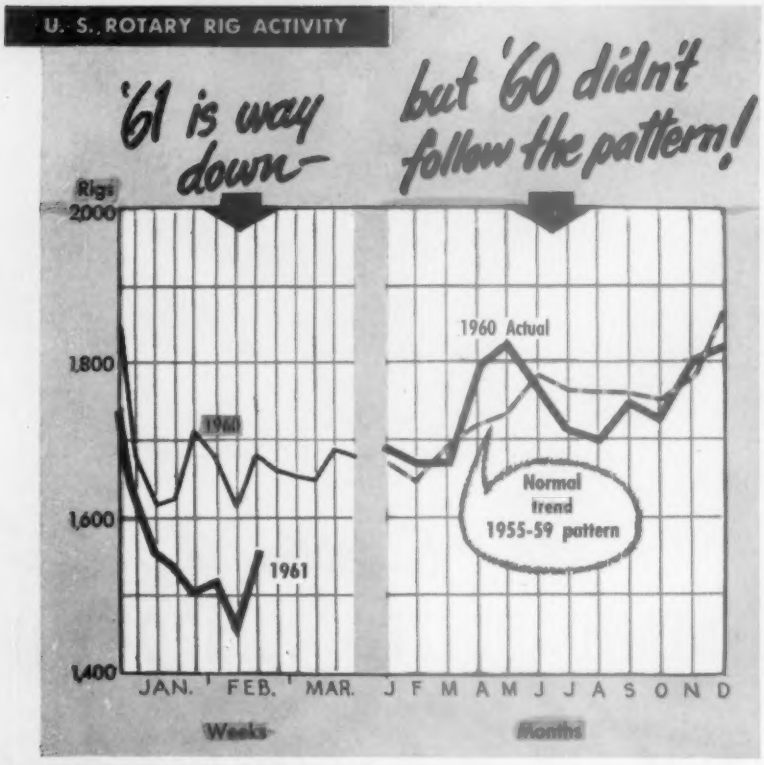

In checking drilling remember

1960 Was an Odd Year

DRILLING so far in 1961 is lousy by any standard.

But it usually is off this time of year, and operators certainly didn't expect 1961 to be an exception. In fact, many of them warned late in December the first quarter would be tough.

Activity will undoubtedly pick up with better weather. There was a slight stirring last week—74 more rotaries were at work than the week before. The 1,553 at work last week, however, still was far short of the 1,683 working at the same week in 1960. This has been true of every week this year.

Therein lies the point of this study. In watching the ups and downs of drilling trends this year, comparisons with 1960 will be tricky.

The reason is that 1960 itself was a year of unusual trends. As the chart shows, drilling in 1960 was above the 5-year average the first 2 months, ran into weather trouble in March, and then shot well above average.

The industry, however, suddenly changed its drilling programs in June, and for the rest of 1960 drilling was below the average, except for a slight spurt in November.

If 1961 only follows the average, February will be the low month, rising steadily to good activity in June. Work usually levels off some in the summer and early fall and then spurts to the year's peak in the last 3 months as operators complete their year's programs.

As for comparisons with 1960, even average business this year until June will look terrible and through the summer it will appear to be good.

Operators originally expected total 1961 drilling to closely parallel activity in 1960. The year is off to one of the slowest starts in postwar history; but there is still plenty of time to catch up.

Operators have completed 6,363 wells compared with 6,500 at this time last year. They told The Oil & Gas Journal at the start of the year they planned to drill 46,964 wells, about the same as the year before.

FPC Asked to

TENNESSEE Gas Transmission Co. went to the Federal Power Commission last week with an "either-or" application for its proposed Texas-to-California gas pipeline via Mexico.

The company's subsidiary, Tennessee California Gas Transmission Co., asked the FPC, first, to decline jurisdiction over the 105-mile portion of the line from South Texas to the Mexican border. Tennessee said the proposal does not involve selling or transporting gas in interstate commerce.

In the event the commission fails to agree with this line of reasoning, the application asks that Tennessee California be granted authority to build and operate the line.

The first request points up an advantage which companies involved believed they have gained with the Mexican route—freedom from FPC regulations.

The basic plan of the $225 million project is to move 380 million cubic feet of gas daily from South Texas into Mexico at Reynosa, pick up another 75 million from Mexico's Reynosa field, and move the gas across northern Mexico to Mexicali. It would then be imported and

INDUSTRY

Merger of Consolidated Oil and Gas, Inc., Denver, and Midland Oil Co., Cheyenne, has been approved by stockholders of both firms. The merger gives Consolidated, the survivor, interests in 91 oil wells, two gas wells, and drilling leases on land adjoining the Teapot Dome Naval Oil Reserve in Wyoming. Altogether, the merged company has about 50,000 acres in Wyoming and 20,000 acres in Colorado.

Tidewater's marketing program in southern California has been beefed up by the purchase of Pathfinder & Community Stations, Inc., which owns a chain of 67 retail outlets. Some of the stations are in Central California and Nevada. Tidewater will continue the stations as inde-

Waive Control on Part of Mexican Line

moved to Southern California Edison Co. plants in the Los Angeles area.

Petroleos Mexicanos, the Mexican oil agency, would own the line in Mexico, and Humble Oil & Refining Co. would furnish the bulk of the U. S. gas for the project.

The application before the FPC notes that all of Tennessee California's facilities would be within the State of Texas and the company does not propose to make sales of gas for resale in interstate commerce or to move it in interstate commerce.

"Thus, applicant's proposed operations will not come within the meaning of the Natural Gas Act, nor will it be a natural gas company as defined by the act," the application says.

The portion of the 1,200-mile line covered by the application consists of 105 miles of 26-in. line. It would go from Humble's King Ranch gas - processing plant south through Kleberg, Brooks, and Hidalgo counties to the international boundary near Reynosa.

The project also includes 69 miles of laterals, 12-in. and smaller, connecting the mainline with other South Texas gas fields. Capacity would be 380 million cubic feet daily.

Should the FPC determine that it does have jurisdiction over the Texas line, the project would be subject to rate regulation and the application would have to run the usual FPC gauntlet of hearings.

Separate applications for presidential authority to export and import gas were filed earlier with the FPC.

Application by another Tennessee Gas subsidiary to construct the California portion of the line is pending before the California Public Utilities Commission. Testimony in the case was heard in January and further hearings are set for March 15.

Big TGT Gas Deal May Hinge on Hearing

A HEARING before the Federal Power Commission on March 27 may determine the fate of a $68.3 million gas-purchase deal by Tennessee Gas Transmission Co.

The application asks construction approval for $2.3 million facilities to transport gas from two Louisiana blocks to existing Tennessee Gas lines in South Louisiana. But a contract for TGT purchase of the leaseholds involved in the tie-in hinges on the outcome of the case.

Tennessee Gas began dealing for the reserves more than 3 years ago. They are in the north half of Block 46, Vermilion area, and Block 64, East Cameron area. They were developed by the MCN group (Mobil-Continental-Newmont).

Negotiations were concluded last year with an agreement that Tennessee Gas would purchase over a 16-year period a major portion of the leaseholds. An estimated 469.9 billion cubic feet of gas is involved.

The deal has some similarities with Tennessee Gas' recent purchase of more than 1 trillion cubic feet of Bastian Bay (Plaquemines Parish) gas from Pan American Petroleum Corp. (OGJ, Feb. 6, p. 86). In this case the Houston firm added the big reserves to its own gas supply and presumably can move it without rate regulation by FPC.

BRIEFS . . .

pendent outlets. The company also markets on the West Coast through Seaside Oil Co., a subsidiary.

Unit allowables in New Mexico for March are the same as in January and February. The state's Oil Conservation Commission set figures of 35 bbl. daily for southeastern New Mexico and 70 bbl. daily for northwestern New Mexico's San Juan basin.

Florida marketing properties have been acquired by Florida Southern Oil Co., subsidiary of Frontier Refining, Denver. The company has purchased seven service stations and marketing sites in East Florida. Marketing will be under Frontier's Beeline trademark. The company plans a terminal at Jacksonville.

Opening of product - distribution terminals in Madison, Wis., Savannah, Ga., and Montgomery, Ala., gives Shell more flexibility in its marketing territories. Total storage capacities are 4,200,000 gal. at the Madison terminal, 3,900,000 at the Savannah terminal, and 735,000 at the Montgomery terminal.

Four bills extending the powers of the Utah Oil and Gas Conservation Commission have been passed by the state senate. They would allow the commission to finance its operations through an oil tax of not more than 2 mills, to regulate underground storage of oil and gas, to exercise more authority in connection with drilling logs and plugging of wells, and to establish drilling units which might deviate from section lines and from prescribed acreage limitations.

A permanent 30-well drilling platform is planned 1½ miles off Huntington Beach, Calif., by Signal Oil. The platform would be used to further develop Huntington Beach field, third largest in California. Signal needs the platform to develop shallow zones which cannot be economically drilled by whipstocking. The platform will be in about 40 ft. of water if plans are approved by the state and the Corps of Engineers.

Occidental Petroleum, Los Angeles, has received court permission to drop plans to reorganize and control Parker Petroleum, Ponca City, Okla. A U. S. District Court in Oklahoma earlier had ordered Occidental to carry out the plans, but this was overruled by the U. S. Circuit Court of Appeals, Denver.

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Texas Crude Runs Rise as Distillates Shrink

- January's average daily rate of 6,356,757 bbl. is well above the December figure. Continued cold in North and East keeps distillate demand high.

REFINERS of Texas crude stepped up the processing tempo sharply last month as distillate inventories melted away.

Reports to the Texas Railroad Commission show that refiners buying crude in Texas ran oil to stills in January at an average daily rate of 6,356,757 bbl.

At this level, they ran an average 335,620 bbl. daily more crude than in December — which in turn chalked up a 116,250 bbl. daily increase over November.

Meanwhile, continued cold weather in the North and East pared another 31,000,000 bbl. off the industry's total inventory of crude and products.

Total storage as of February 1 was only 477,466,700 bbl.—as compared with a total of 508,562,200 bbl. on January 1.

This, together with a 24,000,000-bbl. drop in total inventory held by these firms during December, brought a 2-month slide of more than 55,000,000 bbl.

The decline in January was due to heavy distillate demand and to refiners' eager consumption of crude.

Distillate stocks fell another 27,327,500 bbl. in January from 114,301,000 bbl. on January 1 to only 86,973,500 bbl. on February 1. At the same time crude stocks slid off sharply to 175,647,100 bbl. from 183,977,900—a drop of 8,330,800 bbl.

Kerosine stocks held by the 36 reporting refiners dropped 3,764,800 bbl. to a total of 21,193,200 bbl. on February 1. Residual storage declined a nominal 1,261,300 bbl. to 27,319,700 bbl. on that date.

Gasoline zooming . . . The total stocks decline would have been considerably larger except for a big boost in gasoline stocks.

Motor-fuel storage rose 9,568,200 bbl. to reach 166,313,200 bbl. on February 1.

And individual-company stocks figures show that the gain was due wholly to major-company operations.

Gasoline stocks held by 13 major companies zoomed 11,194,000 bbl. during the month.

Indiana Oil Purchasing headed the parade by adding 1,800,000 bbl. to its gasoline storage. Gulf, Shell, Socony Mobil, and Texaco were close behind with increases of 1,700,000 bbl., 1,600,000 bbl., 1,550,000 bbl., and 1,350,000 bbl., respectively.

Indiana also led in eating up its crude storage, showing a drop of 3,605,000 bbl. during January in its crude inventory.

Majors' runs soar . . . Runs of 13 major buyers of Texas crude rose 330,554 bbl. daily in January. Their runs jump lacked only 5,000 bbl. daily of representing the total increase in runs by all 36 companies reporting.

Humble Oil & Refining Co. was the runs-increase champion, chewing up 84,600 bbl. daily more crude in January than in December. Humble's runs went from an average 761,000 bbl. daily in December to 845,600 bbl. daily in January.

Indiana hiked its January runs by 58,000 bbl. daily to average 693,000 bbl. daily. Coupled with a runs boost nearly this large in December, this makes Indiana's total 2-month hike since November a whopping 108,000 bbl. daily.

All told, seven major refiners boosted their runs more than 6% above their December rates.

Near desired levels . . . Despite the big gain in gasoline storage, the companies reporting to the commission appeared relatively well satisfied with present storage levels.

Gasoline stocks were reported as being only 2,863,400 bbl. too high at 166,313,200 bbl. Kerosine was slightly in surplus (277,200 bbl.) at 21,193,200 bbl.

On the other hand, the companies reported crude storage 7,142,200 bbl. too low at 175,647,100 bbl., distillate 7,962,600 bbl. too low at 86,973,500 bbl., and residual 3,559,400 bbl. too low at 27,319,700 bbl.

Refinery Runs

Company—	Avg. runs in bbl. daily
American Petrofina	22,949
Atlantic Refining	200,625
Bell Oil & Gas	6,590
Bryson Pipe Line	405
Century Refining	3,243
Cities Service Oil	263,462
Continental Oil	181,527
Cosden Petroleum	36,665
Crown Central	35,685
Danaho Refining	4,021
El Paso Natural Gas	18,857
Gulf Oil	471,000
Humble	845,600
Ind. Oil Purchasing	693,000
LaGloria Oil & Gas	16,957
Monarch Refining	2,430
Ohio Oil	100,699
Permian	3,134
Phillips Petroleum	216,900
Plymouth Oil	29,979
Premier Oil Refining	12,015
Pure Oil	166,319
Rado Refining	708
Shamrock Oil & Gas	23,481
Shell Oil	524,040
Signal Oil & Gas	47,530
Sinclair Crude Oil	433,469
Skelly Oil	53,254
Socony Mobil Oil	611,000
Sohio Petroleum	124,548
Standard of Texas	50,532
Sun Oil	204,292
Suntide Oil	44,470
Texaco	652,204
Tidewater Oil	251,450
Wickett Refining	1,815
Others	1,902

ASTM May Handle LPG Data

LPG specifications set by the Natural Gasoline Association of America may soon be taken over by the American Society for Testing Materials.

Members of ASTM's Committee D-2 have approved the move, and it will be submitted to a mail ballot of all members.

Involved are specifications covering vapor pressure, volatility, heavy residue, sulfur content, and water content as moisture.

NGAA for some time has wanted to get out of the field of specifications. As it stands now, ASTM will issue the set of specifications as a tentative standard for 1962. After a year, the set can become a full standard and be subject to acceptance by other bodies.

Soviet Plan: Triple Chemical Output by '65

• If the goal is met, the Russians may then enter world markets on a big scale, a Commerce Department consultant says. Such a big leap forward will require an investment of more than $20 billion.

RUSSIA'S CHEMICAL industry may be lagging badly now but by 1980 its output may exceed that of the United States.

A 7-year plan started in 1959 calls for production to be tripled by 1965. At that time annual output of Soviet plants will be about one-half that of U. S. plants. Soviet participation in world chemical markets on an extensive scale is not expected until after 1965.

To achieve its 7-year goal, Russia plans to invest some $20 to $25 billion in new plants and equipment. More than 140 new large chemical plants are to be built and more than 130 plants are to be modernized.

This insight on the status and goals of the Russian chemical industry was given by Alonzo P. Brown, Jr., consultant to the Department of Commerce's technical services group, to the Synthetic Organic Chemical Manufacturers Association in New York.

Whether this goal is achieved or not, Brown foresees a continued rapid growth for the Soviet chemical industry. If the 1965 production plan is only two-thirds fulfilled, it will probably have grown twice as fast as that in the U. S. At the present rates of growth in both countries, Brown said, the USSR will have overtaken the U. S. in chemical output by 1980.

Current status . . . Last year the USSR was the world's second largest producer of chemicals and rubber, with an output equal to 30 to 40% of the U. S.. To reach this level of production it had grown an average of 15 to 16% each year during 1950-58.

A number of serious problems confronted the industry when the 7-year plan was started in the first part of 1959. The output of synthetic products — plastics, chemical fibers, detergents, and pesticides— was lagging. Production was insufficient. And much of the processing was carried out by obsolete and uneconomical methods. Plants were poorly automated and mechanization of material handling was limited.

An outstanding example was synthetic rubber. Practically all of the butadiene was produced from ethyl alcohol, a large part of which was derived from agricultural products. Refinery gas containing butane and butenes was wasted.

A few chemicals, such as ethyl and isopropyl alcohols and phenol, were made by petrochemical processes. Main sources of USSR hydrocarbons, however, were coal and agricultural products.

The 7-year plan . . . The plan calls for great things. Production of synthetic organic chemicals is to be extensively developed. For example:

. . . **Synthetic fiber** output is to be stepped up 12 to 13 times.

. . . **Plastics** and synthetic resins production is to increase by about seven times.

. . . **Synthetic rubber** manufacturing is to be nearly tripled. Of the total synthetic rubber output planned for 1965, almost 25% is to be polyisoprene.

Although no figures were given for the plan, Brown says information suggests the 1965 goal for polyisoprene is on the order of 200,000 tons. Practically all of this will come from refinery and natural-gas feed stocks.

Since the Soviets probably don't have a commercial process for polyisoprene at this time, Brown regards the goal as unrealistic.

How it's faring . . . During 1959 to 1960, the program has lagged behind the 16% annual increase needed to realize the 1965 goal.

First, and most revealing, capital investment was less than planned. About $3.25 billion was spent on new plants and equipment, 16% less than planned.

Among the important product groups, only the plans for chemical fibers, fertilizers, and motor vehicle tires were reported to have been fulfilled in 1959 and 1960.

A recent press article complaining about the shortage of tires leads Brown to conclude that while the Soviets are meeting the goal in volume, the tires are inferior in quality.

The fact no statistics on synthetic rubber have been given out also suggests unsatisfactory progress.

Little progress has been evident so far in the building of facilities to produce polyisoprene.

Thus fulfillment of the 1965 goal for synthetic rubber seems unlikely.

Manufacture of chemical equipment, which has been a chronic headache to Soviet planners, has been running behind plan also. This, coupled with the lagging investment program and slow progress in some phases of chemical production, points to the over-all 1965 plan's not being fulfilled.

One factor which is aiding the

PROCESSING

A new type polyethylene resin is being produced by Celanese Polymer Co., a division of Celanese Corp., in facilities recently completed at a polyethylene plant near Houston. Over-all capacity of the plant is 60 million pounds per year. Celanese says the new process makes very long-chain linear polyethylene molecules of superior properties as efficiently and economically as processes making regular grades of linear polyethylene.

A polypropylene unit has been put on stream by Texas Eastman at its Longview, Tex., plant. A production rate of 20 million pounds yearly is expected to be reached by midyear. The continuous process being used, one of two developed by Eastman researchers, uses rela-

plan, however, is the increasing amount of aid being obtained from the free world.

In the past 2 years, about 50 chemical plants and large amounts of miscellaneous chemical equipment have been purchased from western European countries.

For the next 5 years, Brown anticipates the USSR chemical industry will have an annual growth of about 19%. This would be only two-thirds of the goal. But it would bring their chemical producing level up to one-half that of the U. S.

Oregon Gets Leasing Ideas

OFFSHORE-LEASING terms which call for competitive bidding based on the highest cash-bonus bid have been recommended to Oregon's attorney general by California oil operators.

The recommendation was made to Atty. Gen. Robert Y. Thornton by the Western Oil and Gas Association. Thornton has been instructed by Oregon Gov. Mark O. Hatfield to draw up an offshore-leasing law for presentation to the state legislature, now in session.

The association also suggested the leases carry a flat royalty rate of not less than 12½% and that the leases be granted for 10-year terms with a 5-year drilling commitment.

Ice Slows Oil Barges on the East Coast

THE Coast Guard ship Mariposa is shown clearing a channel through ice 12 to 20 in. thick for a convoy of four barges and three tugs on the Hudson River. The Plattsburgh Socony, in the foreground, loaded with 21,600 bbl. of heating oil, and the other barges made the 70-mile trip from New York City to Newburgh, N. Y., in 27 hours. Normal time for the voyage is 8 hours.

The convoy helped to replenish low supplies.

Ice on the Hudson this winter has been thicker than at any time in the last 40 years.

BRIEFS

tively low pressure and a three-component catalyst system which produces a very low ash polypropylene.

The wax refinery of Petroflex Corp. near Woods Cross, Utah, has been leased to Beeline Division of Frontier Refining Co. Frontier has not announced its plans for the facilities.

A Hydrotreater for removing sulfur from 12,000 bbl. of kerosine daily is being built at Texaco's Port Arthur, Tex., refinery. Completion is set for midyear. Fluor Corp. is the contractor.

The petrochemical complex, to be built on the Houston Ship Channel by Tennessee Gas Transmission Co., will be under the supervision of Tenneco Chemical Co., a newly formed subsidiary. In addition to producing 100 million pounds of acetylene and about 200 million pounds of vinly chloride monomer yearly, the complex will make vinyl acetate monomer and probably ammonia.

The auto's role in air pollution will be discussed by experts at the semi-annual meeting of the National Petroleum Association in Cleveland, April 19-20. The topic will be among those covered in a first-day symposium divided between technical talks and a panel discussion.

A contract to build a cis-polybutadiene plant at Institute, W. Va., has been awarded to Blaw-Knox Co., Pittsburgh, Pa., by Goodrich-Gulf Chemicals, Inc. Blaw-Knox will be responsible for detail design, procurement of materials and construction of facilities under the Goodrich-Gulf process specifications and process engineering.

A process for abatement of refinery pollution which has been tested successfully for several years at Sun Oil's Toledo refinery (OGJ, May 28, 1956, p. 118), is being made available to refiners as part of Universal Oil Products' pollution-control programs. The Sun-developed method provides for comprehensive control of all plant waste waters and allows reuse of waste-water streams with minimum pretreatment. Through biological oxidation of waste waters during reuse in cooling towers, the process has reduced phenols substantially and also has lowered chemical oxygen demand.

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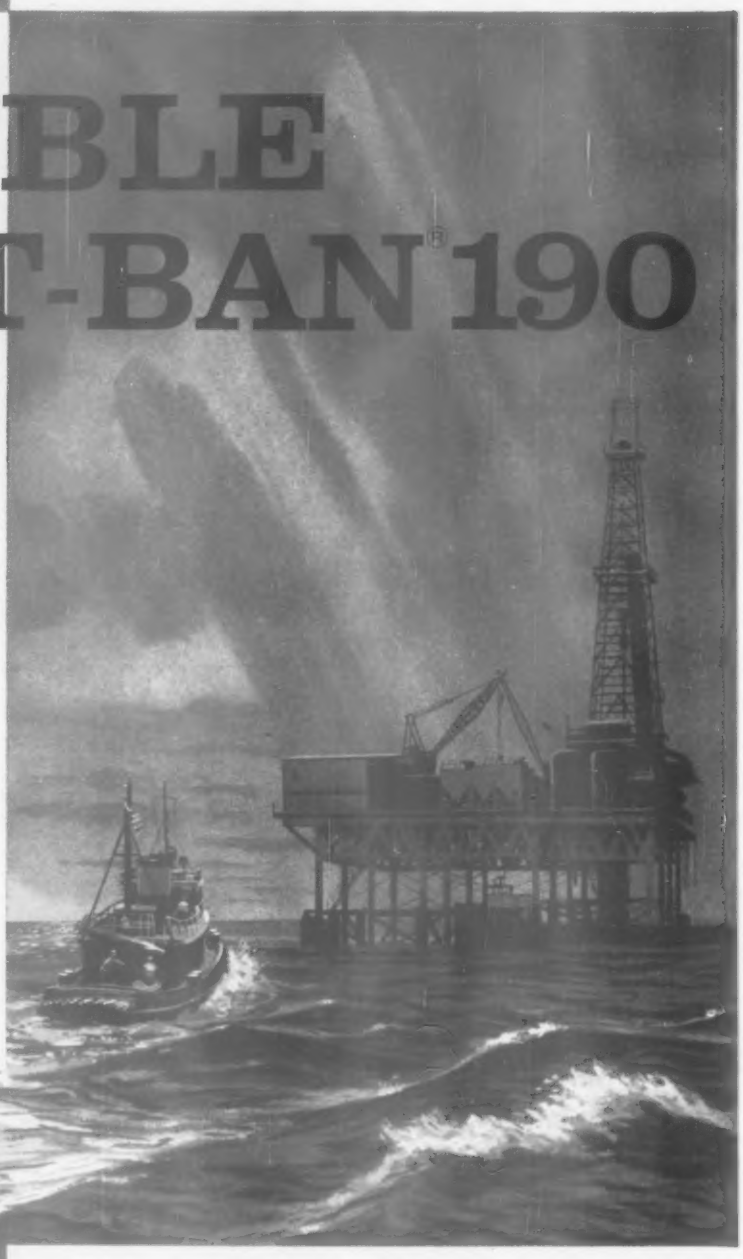

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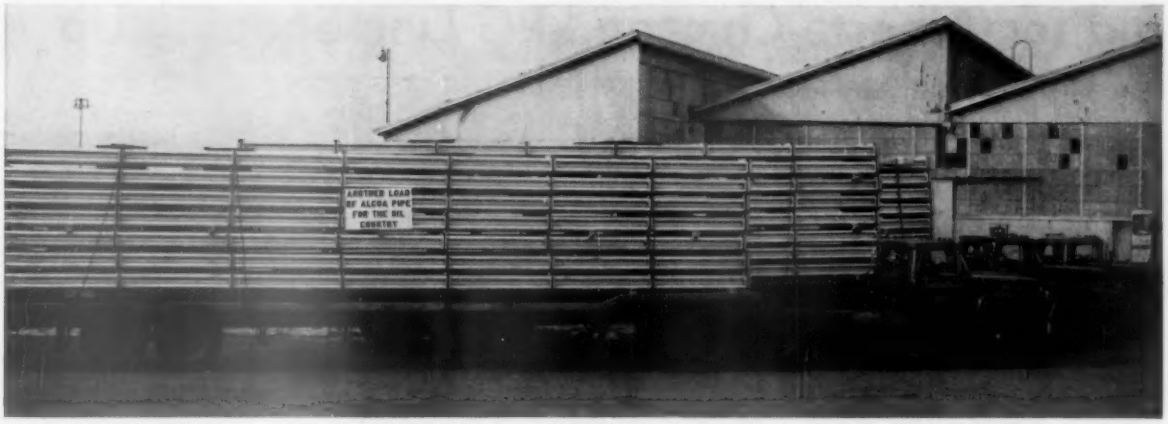


Aluminum Pipe Starts Journey to Peru in Trucks

FIFTY MILES of aluminum pipe manufactured in California will be installed as offshore flow lines in the Pacific Ocean off Peru's northern coast.

The 40-ft. lengths of pipe were produced at Aluminum Co. of America's plant in Vernon, Calif. They were loaded aboard nine trucks for the trip to the Port of Long Beach. Part of the caravan is shown in the photo.

The 300,000-lb. shipment of 2 and 3-in. pipe was placed on a freighter bound for Talara, Peru.

Peruvian Pacific Petroleum Co. will install the lines. The company is jointly owned by Richfield Oil Co. and Cities Service.

This is the second shipment of aluminum pipe to Peruvian Pacific since the company announced the world's first underwater completion in the open sea, off northern Peru (OGJ, Oct. 3, 1960, p. 65).

The historic discovery, Humboldt 3-3, is 6,200 ft. offshore in 132 ft. of water. It flowed at the rate of 480 bbl. of 36.5°-gravity crude daily, but was cut to 200 bbl.

Commercial Scouts May Work the East

COMMERCIAL scouting soon may invade the eastern United States.

Several major operators have asked that proposals be submitted for contract scouting of the Appalachian basin areas of Pennsylvania, New York, West Virginia, and eastern Kentucky.

They also have asked bids on Michigan coverage.

The same majors last week requested contract scouting agencies to give prices for Illinois, Indiana, and eastern Kentucky. The Kentucky area now is served through the Evansville, Ind. scout check.

Among those having representatives in the Evansville check are Ohio Oil Co., Humble Oil & Refining Co., Texaco Inc., Ashland Oil & Refining Co., Bell Brothers, Illinois Geological Survey, Indiana Geological Survey, and a syndicate with eight scouts representing more than 80 independents.

Eight of the companies and agencies in the check have asked for contract scouting cost figures on the two areas.

Operations in 15 states—all west of the Mississippi River—are now served by three commercial-scouting agencies (OGJ, July 4, 1960, p. 63).

Proposals for contract scouting the new areas will be screened by a special committee of the Evansville check. Recommendations will be ready for group action in late March.

Conoco Plans Deep Oklahoma Wildcat

CONTINENTAL Oil Co. is ready to spud a $1-million 20,000-ft. wildcat in northeast Washita County, Oklahoma, where it hopes to find the deep sands tapped by other western Oklahoma producers.

If it reaches target depth, the wildcat will be only the fourth well in Oklahoma to hit 20,000 ft.

Location is 9 miles south of Weatherford. Nearest production is a Sunray Mid-Continent gas well 15 miles to the northeast.

The wildcat, in Section 19, 11N, 14W of Washita County, will be labeled the 1 North Corn unit.

Continental said the ultradeep exploration well has the Morrow-Springer, Hunton and Simpson sands as primary objectives. Secondary objectives are the upper Missouri and Des Moines sands.

The company has an interest in about 9,500 acres in the area and owns 71% of the well. Whitehall Oil Co. owns 10%, while four majors and seven individuals own the remainder. Tidewater, Sunray Mid-Continent, Sun, and Texaco are the majors.

Parker Drilling Co., Tulsa, contractor, is moving in a 130 National rig which has been used in deep drilling in West Texas. The rig has E-500 and E-700 mud pumps and four PTD-8 Superior power units.

The other three deepest Oklahoma wells are Shell's 5 Rumberger in Beckham County, 24,000 ft.; Mobil's Sterba in Caddo County, 20,426 ft.; and the K. A. Ellison, the old Anadarko Basin 1, which was reworked to a total depth of 21,021 ft. It is now known as the Miller-Long unit 1.

Bid for Alberta-Chicago LPG Line Shaping Up

- **Interprovincial set to press for approval of $20-million project.**

THE STAGE is set for Interprovincial Pipe Line Co. to make its bid to ship surplus Alberta natural-gas liquids to Chicago.

Interprovincial proposes to build a 400-mile 10-in. line from a point on its Edmonton-Toronto crude-oil system at Superior, Wis., to Chicago. The project would cost $20 million.

Interprovincial has already proved its ability to batch a mixed stream of condensate, butane, and propane in its crude system by shipping 100,000 bbl. of the liquids. Further shipments are planned as the liquids become available. Interprovincial has set a tariff which it believes will be lower than any competitor can establish.

Several groups have been pressing applications for gathering systems and export permits for months before the Alberta Oil and Gas Conservation Board. The surplus natural-gas liquids will become available in large volumes when gas-export projects to the U. S. get under way late this year (OGJ, July 18, 1960, p. 57).

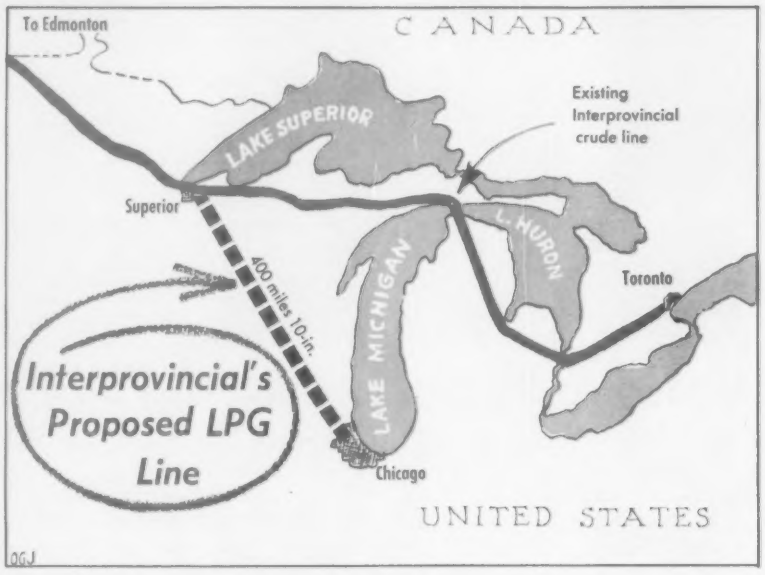
Bid due soon . . . Up to this time, Interprovincial has been waiting in the wings while the purely provincial questions are settled.

But when the Alberta board makes its decisions, perhaps in March, the National Energy Board will be asked to approve the export and the method of moving the liquids. This is when Interprovincial will make its formal application before the NEB and actively enter the fight.

The only major export pipeline to be announced officially is the 1,400-mile 16-in. line from Alberta to Chicago proposed by Standard Oil Co. (Ind.) and Pembina Pipe Line, Ltd. The combined gathering and trunk system would cost $150 million.

At stake is a volume of business which may build to 50,000 bbl. daily by 1963.

"The additional volume of natural-gas liquids fits in well with our expansion plans for the transportation of crude oil," an Interprovincial spokesman said last week. "With this large system of ours already operating, the additional volume will be economic to the pipeline and the shipper."



Interprovincial operating at about 400,000 bbl. daily, has spare capacity to handle much of the load and can absorb it with relatively minor capital outlays. It could also deliver the product to other U. S. and Canadian markets which it now serves.

Interprovincial's move . . . Interprovincial's participation in the Alberta hearings to this point has been confined to issuing three statements on its position.

The essence of first two statements: If there is a market for the surplus liquids, and if their export is within the spirit of the U. S. imports-control program, then Interprovincial is prepared to transport them to market.

The third announcement went further. "We are now prepared to extend our line from Superior to Chicago," the company said.

"Accordingly, Interprovincial has established an Edmonton - to - Chicago pipeline tariff for the shipment of natural-gas liquids with Reid vapor pressures up to 35 psi. The announced tariff varies with the daily volume to be shipped. At 20,000 bbl. per day the tariff is 55 cents per barrel; at 50,000 bbl. per day the tariff is less than 44 cents per barrel.

"The tariff for volumes between 20,000 and 50,000 bbl. per day will decline as the volume increases. Above 50,000 bbl. per day, the tariff will be similarly reduced."

The pipeline contends that its transportation cost will result in the

PIPELINE

Gas service will be extended to Elmira, Elora and Fergus, Ont., this year when Ontario Natural Gas Storage & Pipelines, a subsidiary of Union Gas Co. of Canada, completes a transmission line from Waterloo, Ont. Completion is expected by August.

Gas from Utah's Uinta basin will be transported through a 94.3-mile 20-in. pipeline to be built by Mountain Fuel Supply and Utah Natural Gas to a point north of Provo, Utah, where the systems of the two companies connect. Proposed construction would total $10 million.

Authorization to spend $6,918,500 on transmission facilities has been granted by the FPC to Arkan-

maximum netback to the Alberta producer. Standard and Pembina have not announced a tariff.

Interprovincial says it can begin immediately to ship liquids as they become available to Great Lakes refining centers of the U. S. and Canada. Until the Superior-Chicago line is built, the liquids will have access to that market by tanker from Interprovincial's Superior marine terminal.

Interprovincial would batch liquids in the early stages. When volume of liquids grows sufficiently, it proposes to convert one of its Edmonton-Superior crude lines entirely to natural-gas liquids.

The Standard-Pembina combine is willing to use Interprovincial initially when small volumes of liquids are available and the Standard-Pembina facilities are not yet complete. But later it favors its own trunk line to Chicago, with Tuloma Gas Products Co., Standard's LPG subsidiary, purchasing all the surplus liquids (OGJ, Jan. 30, p. 86).

Gathering-system proposals . . . Gathering systems in Alberta are proposed by Westalta Products Pipe Line, Ltd.; Hydrocarbons Pipeline, Ltd.; Provincial Pipe Lines, Ltd.; Britamoil Pipe Line Co., Ltd.; and Hudson's Bay Oil & Gas, Ltd.

Westalta, a Pembina affiliate, proposes to gather products from most of the new plants being built in connection with gas export. However, it recently withdrew its application to build the line that Hudson's Bay proposes from Waterton-Castle River and Pincher Creek plants to connect with the Continental Pipe Line system at the U. S. border.

Hudson's Bay plans to export the liquids from these local areas through the affiliated Conoco line and connecting systems in the U. S.

Britamoil, whose parent British American Oil Co., Ltd., has a stock interest in Interprovincial, proposes to link its Pincher Creek and Rimbey plants with Calgary and Edmonton refineries. Any surplus would be shipped through the existing export lines—Interprovincial and Trans Mountain Oil Pipe Line.

Hydrocarbons and Provincial propose gathering systems which would supplement existing lines and use existing export trunk lines.

Polyaldehydes Gain Some Metal Markets

THE PLASTICS industry now has a product — polyaldehydes — which looks as if it will be a real competitor in many steel markets.

Primary properties of the new materials, extreme toughness and thermal stability, make them suitable for use in pipe and fittings, automotive parts, machinery, and many appliances.

The polyaldehydes available in commercial quantities use formaldehyde as a basic raw material.

Du Pont has been producing the material for about a year. It calls its product Delrin. The company says sales have exceeded expectations. And 80% of the sales have been for applications in which manufacturers had formerly used metal.

Other companies are making plans to move into the field. Celanese Corp. announced last week plans for a $10 million plant at Bishop, Tex., to produce an estimated 20 million pounds annually of a product called Celcon.

Celanese expects to direct its sales efforts mainly at markets dominated by metals. It predicts that demand for polyaldehyde materials will exceed 200 million pounds per year by 1970.

Heyden Newport plans to build a semiworks at Garfield, N. J., for polyaldehydes. It will test market materials early in 1962.

BRIEFS . . .

sas Louisiana Gas. Meanwhile, Natural Gas Pipeline Co. of America has asked for permission to spend $3,500,000 for the same purpose and Transmission Pipeline has filed a bid to spend $3,000,000. Colorado Interstate Gas also has requested authority to spend $800,000 for such facilities.

Snake River crossing of Pacific Gas Transmission's new Alberta-San Francisco 36-in. gas line will be handled by Missouri Valley Dredging Co., Omaha. The river is 1,700 ft. wide at the crossing point near Pasco, Wash.

An Alberta pipeline has been proposed by Royalite Oil Co., Ltd., to connect the Jumping Pound and Wildcat Hills absorption plants with the Valley Pipe Line just outside Calgary. The 4½-in. 25-mile line would transport 11,050 bbl. daily of natural gasoline and condensate to Calgary refineries.

Two projects, totaling 37.23 miles of 6⅝-in. supply laterals, are planned by East Tennessee Natural Gas in Tennessee. Over-all cost would be $977,379.

Washington's Olympic Peninsula, west of Puget Sound, would be served by natural gas by a pipeline proposed by El Paso Natural Gas and Natural Gas Transmission. The line will originate at Olympia, go north to Bremerton and Port Townsend and west to Port Angeles. The project would cost $6,000,000.

A transmission line to serve Two Harbors and Silver Bay, Minn., is planned by Northern Natural Gas Co. The 63.2-mile 16-in. line also would supply the Reserve Mining Co. taconite processing plant at Silver Bay.

A 51-mile 6-in. LPG line which the Brazos Oil & Gas Division of Dow Chemical Co. is building from Sheridan to Markham, Tex., is scheduled for completion in March. The Brazos system will deliver LPG to Freeport. Project cost is $1,200,000.

Two river crossings in Idaho for Pacific Gas Transmission Co. are due for completion in April. River Construction Co. is the contractor on both jobs. The 36-in. gas line crosses the Kootenai River near Bonner's Ferry and the Pend Oreille River near Sandpoint.

New Antitrust Chief to Take Job Seriously

• Lee Loevinger, now a Minnesota judge, is no newcomer to antitrust proceedings—and he thinks they're vital.

A MAN who ranks antitrust enforcement as more important to the nation than everything except survival in the face of nuclear weapons, has been tapped as the new assistant attorney general for antitrust.

He is Lee Loevinger, 47, a Minnesota judge. President Kennedy says he intends to name Loevinger to the post held by Robert Bicks in the Eisenhower administration.

Loevinger, who will resign his post on the Minnesota State Supreme Court to take the capitol job, is no stranger to Washington.

He worked for the Senate Small Business Committee years ago and was in the antitrust division of the Department of Justice.

Once he told the Senate Small Business Committee:

"The problems with which the antitrust laws are concerned, the problems of the distribution of power within society, are second only to the questions of survival in the face of nuclear weapons in importance for our generation."

Loevinger believes government enforcement of the antitrust laws should be supplemented by private parties who are damaged by trust violations. He feels, on the basis of 1958 writings, that even if the antitrust division were multiplied four times "it would not equal the enforcement effectiveness of private action."

He has advocated fewer consent settlements of government court actions against business firms. And, he has urged passage of a law to require the Government to file a public report on any consent settlement, setting forth its evidence. This could be used by private parties in efforts to collect in treble-damage actions.

Loevinger has a friendship with Sen. Hubert Humphrey (D-Minn.) going back to their college days at the University of Minnesota. For a time, he was in law practice with Orville Freeman, now Secretary of Agriculture.

Loevinger will be a key man in many oil and gas matters, such as any antitrust aspects of the oil-import program; the impact of government procurement on small business and competition; and any antitrust activity against oil and other companies.

He will be in charge of the annual report on operations of the Interstate Oil Compact Commission.

Loevinger was born in St. Paul, Minn. He graduated with highest honors from the University of Minnesota in 1933 and received his law degree in 1936.

He practiced law in Kansas City, Mo., and then joined the National Labor Relations Board as a regional attorney. In 1941 and again in 1946 he was an attorney in the antitrust division. Between 1942 and 1945 he was on active duty with the U. S. Navy. From 1947 until his appointment to the Supreme Court of Minnesota, he was a partner in a Minneapolis law firm.

One of his better-known legal works is entitled "The Law of Free Enterprise," published by Funk and Wagnall, 1949.

Clark Seeks Production Again

CLARK Oil & Refining Corp. is setting out again to become an integrated oil company.

It announced last week it has acquired exploration rights on 200,000 acres in the Rocky Mountains and the Williston basin from a major company.

Drilling of the first of several wildcats will begin in March in Wyoming, the company said.

An independent refiner and marketer for more than 25 years, Clark set out early in 1960 to become an integrated company through the purchase of Intex Oil Co., a California producing and exploration firm (OGJ, April 18, 1960, p. 98).

Negotiations were suspended in June of that year with an announcement that the acquisition proved "not as advantageous as originally hoped."

Emory Clark, president of the refining company, did not identify the company from which the acreage was acquired, but he said the leases represented all of the company's undeveloped lands in Wyoming, Nebraska, North and South Dakota, and in most of Montana and Colorado and a portion of Utah and Idaho.

He said his company hopes to produce ultimately a major portion of its crude requirements. The acquisition, he added, is another step in the direction of full integration.

Drilling Platform Built Off California

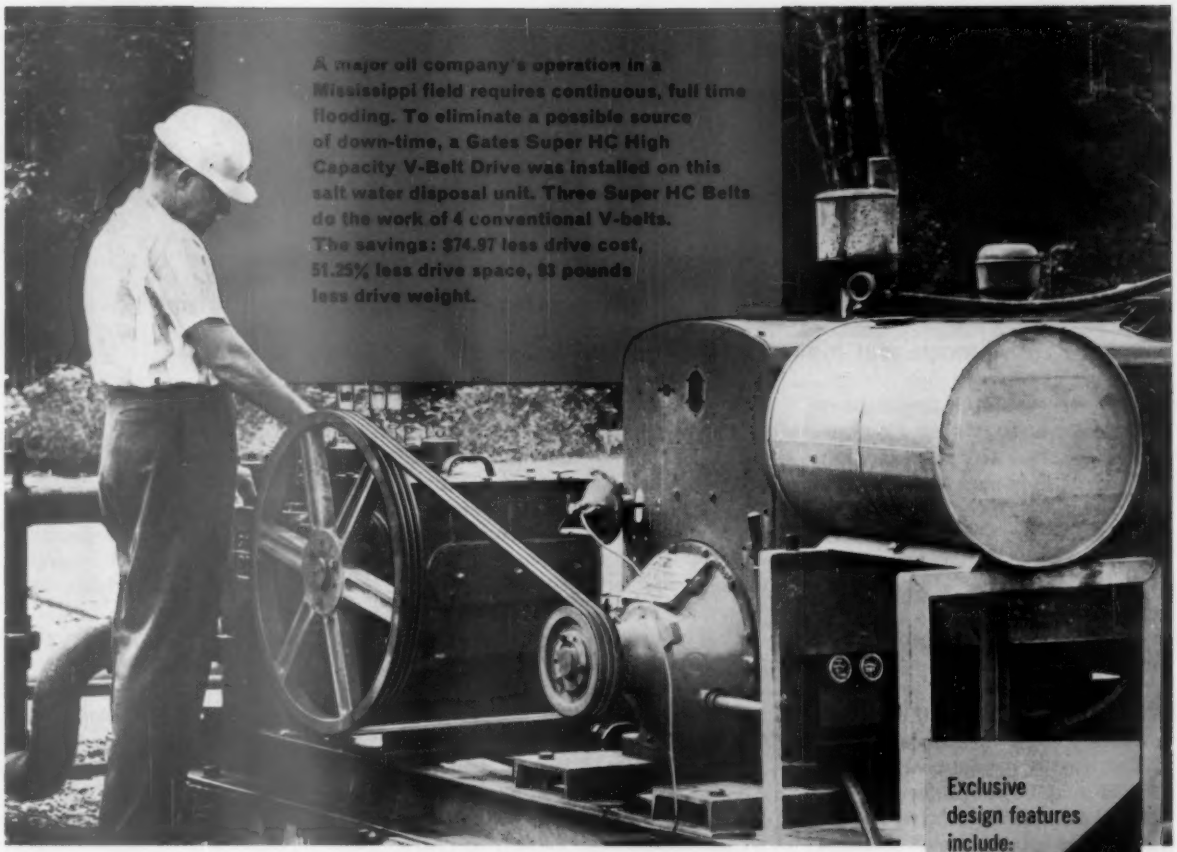
A DRILLING program is about to be launched off Santa Barbara County in California's tidelands.

The Pacific Driller, a mobile platform, has been converted into a permanent 33-well platform to handle drilling on the Santa Barbara tract, which is known as Parcel E. The first well is expected to be spudded soon.

The platform is located about a mile offshore in approximately 100 ft. of water. Offshore Constructors converted the Delong-type platform into a permanent platform. The drilling contract has been awarded to Western Offshore Drilling and Exploration Co.

Parcel E is one of the question marks off California. Phillips Petroleum Co. is operator on the 3,840-acre lease for several companies and individuals. The group has drilled 11 stratigraphic tests on the block, but no information has been released about any of the holes.

A 4,250-acre tract immediately east of Parcel E will be leased by the state next month. Bids are scheduled to be opened March 3. A 4,250-acre tract west of Parcel E drew a blank at a February lease sale (OGJ, Feb. 13, p. 64).


A major oil company's operation in a Mississippi field requires continuous, full time flooding. To eliminate a possible source of down-time, a Gates Super HC High Capacity V-Belt Drive was installed on this salt water disposal unit. Three Super HC Belts do the work of 4 conventional V-belts. The savings: $74.97 less drive cost, 51.25% less drive space, 83 pounds less drive weight.

Transmit greater power in less space with Gates High Capacity V-Belt Drives

Because of basic changes in V-belt shape and construction, Gates Super HC High Capacity V-Belts handle up to 3 times greater horsepower than conventional V-belts in the same drive space. Therefore, the Gates drive can be more compact than a conventional V-belt drive, handling the same power in about half the space.

With Gates Super HC Drives, fewer belts are needed. Sheaves can be smaller and lighter in weight. Bearing loads are less. Center distances can often be reduced. Guards and machine housings can be smaller. Shafts can be shorter. Drive costs are often cut as much as 20%. Shipping weight is less. Furthermore, the drive can operate at belt speeds up to 6,000 ft/min without dynamic balancing. This permits use of higher rpm motors—with savings in motor costs.

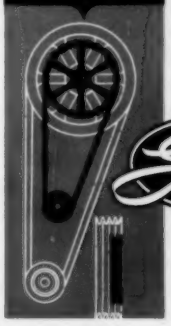
The Gates Super HC V-Belt Drive is in use the world over on all types of equipment. It is the first and most advanced high capacity drive, and it is your best assurance that your power transmission units will not soon become obsolete.

There is a Gates Field Engineer serving your area. To contact him, and to get complete information about the Super HC Drive, call your nearby Gates-stocked supply house.

Exclusive design features include:

precisely engineered arched top, concave sidewalls, Flex-Weave cover, super strength tensile construction.

Gates Super HC Drive saves space, weight and money



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Gates Super HC V-Belt Drives

Building the future on 50 years of progress.

Five Founding Nations to Rule OPEC

• Venezuela and Middle East countries will have veto powers in Organization of Petroleum Exporting Countries. Thorough organizational plans have been made but moves to push up oil prices still seem very distant.

MEMBERS of the Organization of Petroleum Exporting Countries take themselves seriously and it is quite clear they expect the world's oil industry and consuming countries to take them seriously, too.

The founding fathers of oil's little "United Nations" also intend to keep a tight rein on their fledgling organization—now and in the future.

These are two basic conclusions that emerge from OPEC's first working session in Caracas.

The lengthy resolutions approved at that mid-January meeting were delayed for a full 30 days to enable member nations to release them simultaneously in six world capitals. Now that they have been made public, the oil industry is analyzing them carefully and a bit uneasily.

Here are some of the things OPEC has done:

... The organizational care lavished on OPEC is a clear indication that its members intend for it to work and to endure. The bulk of the resolutions deal in great detail with how the working organization is to be set up and how it is to be run. All this is a far cry from the very general resolutions adopted by dissenting producers in the past to condemn practices of private industry.

... The five founding countries—Venezuela, Saudi Arabia, Iraq, Iran, and Kuwait—will hold sway as OPEC's little "Security Council" and each will have veto power over any action proposed by any member of the organization. The five would hold the balance of power even without veto privileges: Each will be represented on OPEC's board of governors, but all new members will be represented collectively by a single member of the board.

... On oil-pricing policies, OPEC obviously has come to the conclusion that there is some truth in the old adage about the mills of the gods grinding slowly but exceedingly fine. The producer group is moving carefully, cautiously, and with obvious determination to document its contention that producers are entitled to higher prices.

... On profit sharing, OPEC is already convinced that its members are not getting as much oil income as they should. But it has directed the board of governors to make a study of oil investments compared with other business investments. This study will be presented to the OPEC conference at Tehran August 19.

... On import quotas and other import restrictions, OPEC has expressed the hope that friendly countries will consult with OPEC on "satisfactory solutions" to promote "mutual understanding."

This is an open invitation to U. S. officials to talk over import quotas with Dr. Juan Pablo Perez Alfonzo of Venezuela, who has long contended that Venezuela should have something to say about the U. S. policy. Just last week the Venezuelan oil minister called U. S. quotas unacceptable.

... OPEC called for collective help for Venezuela because of the curtailment of oil activities in that country. The board of governors was instructed to examine Venezuela's position and propose some action to the conference at Tehran.

... Expressed hope that companies now talking over problems with producing countries will show a "spirit of understanding" that will insure a "prompt and satisfactory conclusion." This is an obvious reference to the prolonged discussions between Iraq Petroleum Co. and Iraq over changes the latter would like to make in its concession agreement.

The conference . . . The resolution which sets the form for the OPEC conference places the real power to act in this general assembly of the members without specifying how many representatives each member shall have.

This is done, however, without diluting the power of the five founders. Any decision of the conference requires the unanimous agreement of the founder members.

The conference will meet twice each year at the capital city of one of the members to act upon the recommendations of the board of governors and to hear its reports.

Candidates for new membership in this conference must be "substantial" net exporters of oil and must be unanimously accepted by the five founders of OPEC.

Board of governors . . . Actual work of the OPEC administrative staff will be under the direction of the board of governors and its chairman. The board will meet at least once each quarter.

Fuad Rouhani, National Iranian Oil Co. director who was appointed the first board chairman at Caracas, will serve until the end of 1962. After his term, the conference will appoint chairmen for 1-year terms and the office will rotate among the members in alphabetical order.

The board of governors is charged with responsibility for an annual budget as well as responsibility for setting up the administrative staff and establishing OPEC as a working group before the August meeting at Tehran.

The first budget of $420,000 was approved at Caracas.

The five founders will contribute

to this budget in equal amounts. A budget contribution for Qatar, the new member accepted at Caracas, will be set later.

Pricing policy . . . Each of the OPEC members has until March 21 to compile and send to the board of governors a documented statement of its position on oil prices and how it believes disputes between producing countries and companies should be settled.

Then the governors will present the various policy statements to "competent legal advisors" for advice on how OPEC can most effectively "restore prices" to the level members believe should prevail.

The board has been directed to make a detailed study of the whole problem of pricing based on these actions by OPEC's members, and to arrive at a "just pricing formula supported by a study of international proration should that prove essential."

Industry reaction . . . The member countries of OPEC quite obviously had one ear cocked for industry reaction in the week that followed public release of the resolutions. It was slow in coming. Most companies are studying the actions of OPEC closely, trying to analyze them in terms of the future before commenting for the record.

Unofficially, a number of reactions were immediately apparent. There was speculation about the tight control of the founder countries. Some industry observers doubt that countries like Algeria and Libya, soon to be substantial exporters, will welcome the idea of joining OPEC as second-class members without equal representation on the board of governors.

There is also industry speculation that the founders of OPEC may have maintained this control to avoid the possibility of Russia's dominating the group if and when the USSR should become a member.

OPEC's members have dodged the question of an invitation to Russia. At the same time, critics of the general aims of OPEC have openly doubted that the group could be effective without cooperation from the world's third largest oil producer and one of its more troublesome exporters.

Three Mobil Finds Look Good

• Discoveries in West Africa's Gabon, in Turkey, and in West Germany show signs of being good commercial fields.

THREE NEW foreign discoveries by Mobil International look more and more like commercial oil fields.

Stepouts have been successfully brought in on discovery structures in Gabon, in Turkey, and in West Germany.

None of the finds promises blue-chip oil. But each of the fields, if commercial, will have a ready market. This is an advantage that some of the big new production elsewhere may not have in the face of a worldwide surplus of crude.

Every barrel from the finds will have a ready local market in Turkey and West Germany. Gabon production, under the approving eye of the French Government, will have an inside track for markets in France.

Outlook in Gabon . . . In Gabon, West Africa, two new wells have enhanced the prospects of a 3,191,000-acre concession held jointly by Mobil companies and Ste. des Petroles d'Afrique Equatoriale Francaise (SPAEF), the operator.

Batanga 2, which is 600 meters or about 1,970 ft. south-southeast of a new discovery, flowed 820 bbl. daily of 37°-gravity crude. This was the gravity found in the discovery.

Total depth of the well is 7,310 ft. It was not learned immediately whether the flow was from the higher or lower of two zones, or both. These had tested 10 bbl. per hour in a 23-ft. pay topped at 1,845 meters or about 6,080 ft.

Another find, at Assewe, may have established a north-south trend in the area where the SPAEF-Mobil group made its first discovery 17 months ago at Rembo Kotto.

Assewe 1 tested 2 to 4 bbl. per hour from a zone topped at 813 meters or about 2,670 ft. The well is one of five structures in a general north-south trend. A wildcat on another of the structures, at Rembo Kotto, tested 340 bbl. daily of high-gravity crude from a pay found at 2,000 ft.

Several more wells at Rembo Kotto have now been completed as producers.

SPAEF already produces 15,000 bbl. daily from a group of small coastal fields held entirely by itself. It farmed out part of its concession 3 years ago to two Mobil companies, Mobilrex and Mobil Exploration Equatorial Africa, Inc., each of which holds 25% interest in the rights.

In Turkey . . . Mobil has completed its third producing well in the Bulgurdag area of South Central Turkey.

The well, Bulgurdag 5 had a final completion rate of 640 bbl. daily of 37°-gravity oil. The discovery flowed 1,200 bbl. daily from 4,700 ft. after acidizing, while Bulgurdag 2 made 1,600 bbl. daily through a ½-in. choke. Bulgurdag 3 and 4 were abandoned.

Even a comparatively small field will be important because of Mobil's strong marketing position in Turkey. The find is 40 miles inland from Mersin, where the company has 56% interest in a 65,000-bbl. refinery now under construction.

The company is now rigging up for two more tests in the same general area. One well is Ceyhan 1, 25 miles east-southeast of Bulgurdag 1, on the east flank of Adana Basin. The other is Dutsuyu 1, 7 miles west-southwest of the new find.

German output pays . . . Mobil's German affiliate has tested 15 tons or about 105 bbl. daily on pump from Velden 3, some 30 miles northeast of Munich. Velden 3 is the northernmost production so far in the Alpine Foothills.

While the commercial payout of the operation remains to be proven, the find promises to be another of the 100-odd West German oil fields that produce a total of 110,000 bbl. daily.

Mobil's share of this production has paid off on the balance sheet. In the recently disclosed annual report for 1959, Mobil Oil AG—in contrast to other international companies—came out in the black with a net of about $4.23 million.

Arab Refinery Plan Reborn

• Royal edict salvages project for privately owned refinery in Saudi Arabia, but no target date is set.

A ROYAL decree has brought back to life a plan for a privately owned refining company in Saudi Arabia.

The edict sanctions the establishment of Saudi Arabian Refinery Co. (SARCO), and approves the company's earlier memorandum of association. SARCO intends to build a 20,000-bbl. refinery on the Red Sea coast of the Arabian Peninsula.

Ralph M. Parsons Co., Los Angeles, has a contract to build the plant, but no schedule to start construction.

Members of the Saud family will hold a large block of stock in SARCO, but the company technically is not a government project.

The plant would fulfill an Arab dream of participating directly in the oil industry. It would take at least half of the local market of Arabian American Oil Co., now the exclusive marketer in the country. Demand is around 9,000 bbl. daily.

Aramco produces more than 1.4 million barrels daily and operates a 189,000-bbl. refinery on the eastern side of the Arabian Peninsula.

The new company was organized last year by Amir Mohammed Ibn Saud, one of the sons of King Saud (OGJ, June 13, 1960, p. 88). But his proposal was shelved for several months.

Royal approval finally came a few weeks after King Saud resumed direct control over Saudi Arabian affairs.

Basra to Use Gas From Iraqi Oil Field

GAS FROM RUMAILA oil field in southern Iraq will be used commercially in the Persian Gulf port city of Basra, starting next year.

A construction contract for a 37-mile gas pipeline from Rumaila to a Basra power plant has been awarded to SAIPEM, a member of the ENI group of companies held by the Italian Government.

The $2.8-million line is scheduled for completion by March 1962.

Initial deliveries will average 14,500 M.c.f. daily. This will be increased as demand for electricity grows. Capacity of the line will be 630,000 M.c.f. daily.

A branch line will deliver gas to a projected fertilizer plant expected to open in 1965. The plant will initially use 9,000 M.c.f. daily and requirements will rise to a minimum of 18,000 M.c.f. daily. It will have an annual output of 116,000 tons of ammonium sulfate, 56,000 tons of ammonium nitrate, and 20,000 tons of sulfuric acid.

Production capacity of Rumaila field is now being increased by Basrah Petroleum, an Iraq Petroleum Co. affiliate, as part of major program to increase crude-producing capacity in southern Iraq from 240,000 to 440,000 bbl. daily.

A 30 to 32-in. crude line is being added to the existing system from Rumaila and Zubair fields to Fao, and deep-water terminal is being built 24 miles offshore in the Persian Gulf.

Belgian Refinery to Expand

THE CAPACITY of Belgium's biggest refinery will be doubled from 80,000 to 160,000 bbl. in a $30.8-million expansion program to be completed in 2 years.

Ste. Industrielle Belge des Petroles, owned jointly by British Petroleum and Petrofina, is adding a distillation unit which will handle 100,000 bbl. per stream day, a 9,000-bbl. catalytic reformer, a 10,000-bbl. hydrofiner, and a 60-ton-daily sulfur-recovery plant.

A gas-recovery unit associated with the distillation unit will increase recovery of LPG.

The existing catalytic cracker at the Antwerp refinery also is being expanded from 12,000 bbl. to 15,000 bbl.

FOREIGN BRIEFS . . .

Gulf's latest Libyan wildcat in Block 66 of the eastern part of the country was swabbed at the rate of 500 bbl. daily. The well, J1, had been testing at 8,000 ft. but it was not learned immediately whether the 38°-gravity oil came from this zone. Gulf has other producing wells in the Emgayet area in the central part of the concession.

In an unusual deal, a private Argentine firm has arranged to operate a YPF oil property and use the output. Industrias Siderurgicas Grassi S.A. will take charge of some of the state oil agency's wells in Pampa Palauco field and use the total of about 300 bbl. daily as fuel in a new smelter at nearby San Martin. YPF will rent operating equipment and collect a royalty on production.

Russian crude production last year reached 148 million tons, or about 2,960,000 bbl. daily, according to official figures. This was an increase of 14.3% over 1959. Gas output totaled 47 billion cubic meters, or about 4,530,000 M.c.f. daily—a rise of 26.4%.

Turkish Gulf Oil Co. has taken a 75% farmout from Deutsche Erdoel AG on three concessions in the Kurdish Mountain region of eastern Turkey. In case of a commercial find, the West German company can either make use of its 25% interest, or transfer it to Gulf in return for royalty payments. The rights cover about 580 sq. miles in Siirt Province.

Russia will supply crude to Finland from 1962 to 1965 under a new contract with Neste Oy Corp., the smaller nation's state-owned refining company. Shipments will total 4.9 million metric tons, or about 24,500 bbl. daily, after completion in 1963 of an expansion program at Neste's refinery. Until then, a level of about 16,000 bbl. daily will be maintained.

Where Rigs Are Running Abroad

	Feb. 1961	June 1960	Dec. 1959
LATIN AMERICA			
Argentina	109	106	99
Bolivia	11	10	11
Brazil	55	48	42
Br. Honduras	1	...	1
Colombia	12	19	28
Chile	6	4	5
Cuba	...	1	1
Dom. Rep.	1	1	1
Ecuador	6	3	4
Guatemala	...	1	3
Mexico	153	134	120
Panama	1	...	...
Peru	11	11	9
Puerto Rico*	...	...	1
Trinidad	24	28	31
Venezuela	30	42	66
TOTAL	420	409	422
MIDDLE EAST			
Bahrain	1	...	...
Iran	14	16	10
Iraq	11	11	6
Israel	4	6	4
Jordan	...	...	1
Kuwait	3	2	3
Neutral Zone	6	6	5
Qatar	1	2	1
Saudi Arabia	3	3	4
South Arabia	3	3	4
Syria	2	2	2
Turkey	11	11	12
TOTAL	59	62	52
WESTERN EUROPE			
Austria	9	9	9
France	30	50	43
W. Germany	100	100	105
Greece	1	...	...
Italy	36	36	36
Netherlands	4	4	3
Spain	7	6	6
Switzerland	1	1	...
U. K.	5	4	5
TOTAL	192	210	207
AFRICA			
Algeria	42	53	40
Angola	3	3	3
Egypt	18	11	11
Senegal	2	3	2
Gabon	1	6	7
Gambia	1	1	...
Libya	30	32	24
Madagascar	1	2	1
Middle Congo	1	1	1
Morocco	1	1	3
Nigeria	4	5	9
Span. Sahara	1	...	...
Somalia	2	2	2
Kenya	1	...	...
Tunisia	1	1	1
TOTAL	109	121	104
ASIA-PACIFIC			
Australia	5	4	3
British Borneo	2	2	2
Burma	3	3	5
Formosa	1	1	1
India	11	6	5
Indonesia	15	15	15
Japan	15	15	15
New Guinea (inc. Papua)	...	1	2
New Zealand	2	1	...
Pakistan	3	5	5
Philippines	1	2	1
Timor	1	1	1
TOTAL	59	56	55
GRAND TOTAL	**839**	**858**	**840**

*Included in Latin America for convenience of reference.
NOTE: Estimates are made where complete up-to-date reports are lacking.

Foreign Rotary Drilling Approaches Record

• With 839 outfits making new hole, the level of activity is near last June's all-time high. One rig is operating abroad for every two in the U. S.

THERE IS NOW one rotary rig operating in foreign areas for every two outfits drilling in the U. S.

The Journal count of rotaries outside the U. S. and Canada in February indicates 839 outfits are making new hole. This is only 18 under the all-time high of last June. Rigs on workover or service operations are not included in the tally.

In the U. S., 1,512 rotaries were active early in the month. There were 192 in Canada, for a total of 1,704.

The grand total for the free world is 2,543.

French Sahara . . . While American companies have their biggest stake in the Libyan oil play, three U. S. firms also are partners in drilling programs now under way in Algeria.

Two rigs are active in Ohanet oil field, where Mobil International has 25% interest. Mobil is associated with five French partners—CEP, REP, Eurefrep, Coparex, and AMIF. CEP, a government-controlled company, is operator.

Five wells have been completed in the 1,500-2,000-bbl.-daily range, and construction has started on a 330-mile 30-in. pipeline to Hassi Messaoud. The new line will later be tied to the Edjele pipeline system (OGJ, Jan. 23, p. 62).

The Mobil-French group also has encountered wet gas in a wildcat now drilling. The well, In Adaoui 101, tests 6,000 M.c.f. daily from Lower Devonian topped at 2,390 meters, or about 8,444 ft.

Phillips Petroleum has 25% interest in a program which has turned up a 35,300 M.c.f. gas well in its latest test in a remote area. Immediate utilization is doubtful.

The well, Hassi Touareg 3, topped a 145-ft. pay at 5,360 ft. Phillips partners in the operation are Copefa and Omnirex. Copefa is operator.

Phillips has 50% interest in another operation with the same French partners at El Atchane.

Sinclair has 44% interest, and Cities Service 34% interest in a wildcat drilling below 12,200 ft. at Daiet Remt. Copefa is the French partner in the group.

In Libya, drilling slackened early in the month, but was still relatively high with 30 rigs making hole. Oasis Oil continues to be the leader with 11 outfits. Gulf Oil has added another rig to its program in Block 66, where it now has two rotaries active.

A JOURNAL SURVEY

PLASTIC PIPE

in oil and gas fields

Manufacturers, suppliers, and users answer questions as to service, pressure ratings, performance, joining, and reasons for using

BY HUGH S. PYLANT
Petrochemical Editor

PLASTIC-PIPE USAGE in oil and gas fields was recently surveyed for the first time by The Oil and Gas Journal. This survey included not only major and independent oil and gas-producing companies, but plastic resin and pipe manufacturers and suppliers as well. Questionnaires, sent to a large representative cross-section of the industry, turned up some very interesting figures and comments.

In general, the survey indicated that while the producing companies aren't quite as enthusiastic about the applications of plastic pipe as the manufacturers, they installed about 25% more of it last year than in 1959, and plan to use an equally large quantity during the current year.

Corrosion resistance headed the list for most companies as the reason for turning to plastic pipe, and the most popular material selected was acryonitrile-butadiene-styrene (ABS), followed pretty close by linear polyethylene (PE).

Manufacturers

There is much speculation by the resin and pipe manufacturers that plastic pipe will be lifted out of the "special" category and put into widespread common use as a result of the continuing search by oil companies to cut operating costs. And to encourage this trend, the manufacturers are striving to produce a higher-quality product and to standardize temperature and pressure ratings of the various materials. Also, the search has been stepped up for materials that will withstand higher temperatures and pressures and still be competitive in price with steel. This apparently is the real key to a big-volume plastic-pipe market.

Just recently an acetal resin pipe has been introduced that has a superior strength and resistance to pressure surging, and should find a good market in the oil field (OGJ, Oct. 17, '60, p. 89).

Another factor that should further encourage plastic pipe's penetration into the oil field was Continental Oil Co.'s purchase of a 25% interest in the world's largest producer of plastic pipe (OGJ, July 4, '60, p. 69).

One manufacturer estimated that 4 million pounds of rigid polyvinyl chloride (PVC) will be used in oil-field lines by 1962, and offered the opinion that the best potential market for this type of pipe was for sour-crude gathering lines and salt-water-disposal lines.

It was another manufacturer's opinion that all oil and gas companies are good prospects for plastic pipe, but that they would have to be convinced that plastics can do the job.

Producing Companies

Plastic-pipe usage appears to be much more widespread among major than independent producing companies. And within companies, some districts used large amounts of the pipe, while other districts indicated that they had no use for it.

Service. Approximately 38% of the plastic pipe in the ground is being used for crude-gathering lines, and more than half of this is ABS, followed by PVC and cellulose-acetate-butyrate (CAB), in that order. Primary reasons given for using

plastic in this service were its resistance to corrosion and paraffin buildup, and its free-flowing characteristics.

Gas-gathering lines account for 24% of the plastic pipe now in use with linear polyethylene making up 95% of this category. These figures are a little misleading, however, since only one company has ventured very far into this field. But several other companies that have experimented with plastic pipe in this service noted that it was very satisfactory for handling low-pressure gas, both sweet and sour.

Salt-water-disposal systems use almost as much plastic pipe as crude-gathering lines, accounting for 32% of the total reported in this survey. ABS pipe is the leader in this service also, making up a little over half of the total footage. Obviously, corrosion resistance was the big factor in picking plastic over steel for this service. One independent producer volunteered this comment: "We do not have any plastic pipe in this district, but if the need should arise for salt-water-disposal lines, I would highly recommend the use of plastic pipe."

There was some small amount of plastic pipe reported in use for flood-water lines in secondary recovery, fresh-water lines, and lines for various chemicals. Polyethylene accounted for the biggest percentage of the pipe used in this miscellaneous category.

The accompanying table shows how the various plastic materials ranked in the different services. The "Other" column is made up primarily of glass-reinforced epoxy pipe which was used mostly in high-pressure salt-water-disposal systems.

Pressure ratings. To the question "How much plastic pipe would you use if higher pressure ratings were available, and what pressure would you require?" replies varied all the way from 125 to 2,000 psi. for the pressure requirements. But the majority seemed to prefer pipe that would withstand 1,000 to 1,500 psi., and they indicated that almost twice as much would be used,—provided the price was competitive with steel.

One of the major producers remarked: " . . . there should be a standard method for pressure rating pipe on which the user can depend for long-term service. At the present time, there is considerable variation from one manufacturer to another . . . for the same size and wall thickness of extruded pipe in each type of plastic material."

Performance. Plastic pipe service was given a rating of excellent by 17% of the companies queried, 51% replied good, 25% fair, and only 7% indicated that their experience with plastic pipe was poor. Two of the companies that rated the performance poor, admitted that the pipe had been used in improper service and they were, therefore, not prejudiced against the material.

Joining. Solvent welding, as a means of connecting joints and fittings of plastic pipe, got the nod from most companies, with threaded couplings mentioned frequently for high-pressure pipe. But, two of the larger users of plastic pipe preferred heat fusion, and two others mentioned tapered bells and clamps.

Reasons for use. When asked why they chose plastic pipe, 55% of the companies replied that the primary purpose was to combat corrosion. And following close on the heels of corrosion resistance, the second major reason for choosing plastic pipe for various services was economics.

Wherever plastic pipe can do as good a job as steel, and is equal to or cheaper in price than steel, companies would prefer the plastic material, showed the survey. The reasons given for this were that plastic pipe is more easily handled and installed, and requires less maintenance after installation.

Others said that they chose plastic pipe to alleviate a scale or paraffin-buildup problem. An in regard to the paraffin problem, one company made this comment: "While we are pleased with the use of plas-

Use of Plastic Materials in Oil and Gas Field Service

	Per cent of total footage				
	ABS	PE	PVC	CAB	OTHER
Crude-gathering Lines	58	8	18	12	4
Gas-gathering Lines	1	97	1	1	0
Salt-water-disposal Lines	52	6	15	4	23
Miscellaneous	1	58	28	4	9

For crude-oil-gathering lines

For gas-gathering lines

For salt-water-disposal lines

. . . majority indicated preference for pipe that would withstand 1,000 to 1,500 psi., and that they'd use almost twice as much if the price were competitive with steel.

tic pipe for oil lines in most cases, there have been instances of paraffin buildup to the extent that the pipe either burst or became plugged up."

Future plans of the producing companies contacted indicate that while 9% plan to start using plastic pipe, 36% will continue their use at about the same rate, and 18% plan to increase usage, only 2% intend to decrease or discontinue using plastic pipe.

Most of the others said that they have no immediate plans for using the pipe, but should the occasion arise, they would be willing to give plastic pipe a try,—if the price is right.

Additional remarks from a major: "There is a definite need for considerable study and development of suitable means of relieving expansion and contraction stresses economically." From an independent, "We have had the experience of risers on buried flow lines breaking due to expansion and contraction."

Another comment from a major producing company, ". . . to facilitate steel-to-plastic connections, the outside diameter of plastic pipe should correspond to standard steel-pipe dimensions. Also, more attention should be given by manufacturers of plastic pipe to properly designed plastic-to-steel fittings, as well as all-plastic fittings."

Silicones combat foaming in residuum storage tanks

BY P. M. WADDILL, D. W. GAGLE, J. A. PRICE, AND D. M. LITTLE
Phillips Petroleum Co.
Bartlesville, Okla.

SIMULATED FROTHOVERS were made using hot asphalt in 55-gal. drums. Residuum in these tests had more resistance to boilovers after silicone antifoam had been added. Fig. 1.

THE DESTRUCTIVE $9-million fire at Signal Oil & Gas Co.'s Hancock refinery at Long Beach, Calif., in 1958, was caused by a steam or water-induced froth wave which boiled over from a visbreaker feed-stock tank and ignited. The fire partially destroyed equipment on 27 acres of the 33-acre refinery.

The pronounced stability of the foamed oil might have contributed to the magnitude of the disaster. A published report[1] stated that the depth of the stable foam was estimated at 1½ to 3½ ft. It swept across the refinery at an average rate of 400 ft. per minute.

After studying laboratory foam tests on residuums and pilot-scale tests of residual tank boilovers, it became apparent to us that an oil with high foaming tendency also had high foam stability. At Signal Hill the oil might have been of this type.

By adding a small quantity of antifoam agent, such as silicone, to residuum, we believed that foaming tendency and foam stability could be cut to a minimum.

Results of this study showed that:

...A concentration of 0.2 p.p.m. by weight silicone antifoam agent in the residuum stocks protected storage tanks from foaming. This concentration did not affect adversely the properties of asphalt.[3]

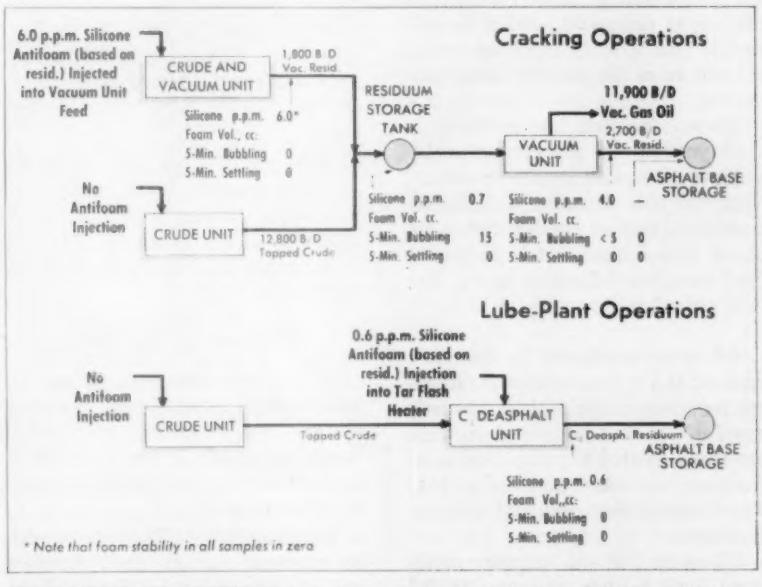
...Silicone antifoam may not prevent a residuum tank from boiling over. But, the oil which has spilled will have nearly zero foaming tendency and foam stability, and the tank dike should contain it.

Boiling or violent heaving spills are usually caused by the sudden generation and expansion of steam. Signal Hill's disaster may have been caused by water being pumped into hot (315° F.) residuum.

...Antifoam agents greatly increase the quantity of steam required to cause a tank to froth over.

...To counteract froth, the antifoam agent should be well dispersed in the residuum.

...In a sequence of processing steps, such as fractionation and vacuum flashing, silicone antifoam remains predominantly in the residuum. Its antifoam properties are not affected.



SURVEY OF FOAM PROPERTIES of refinery residual stocks by modified ASTM foam test. Note that foam stability in all samples is zero. Fig. 2.

Foaming Tendency and Stability

Test procedure. The test used to indicate both foaming tendency and foam stability was a modification of ASTM D-892-58T.[2] This test was originally developed for lubricating oils. It requires three foaming and three settling periods at two temperatures.

To make the modified test, 180 ml. of oil in a 1-l. graduate is held at a constant temperature of 200° F. by immersing it in an oil bath. A spherical 1-in.-diameter gas-diffuser stone is immersed in the sample and air is blown through the stone at a

TABLE 1—MODIFIED ASTM FOAM TEST ON RESIDUUMS

Residuum	Asphalt			Vacuum Residuum									
Test temp. °F.	200	200	200	200	200	200	200	200	200	200	255	255	255
Gravity, °API	11.0	11.0	11.0	16.3	16.3	16.3	16.3	16.3	16.3	16.3	16.3	16.3	16.3
Viscosity, S.F.s. at 210° F.	925	925	925	70	70	70	70	70	70	70	70	70	70
Type of silicone	None	No. 1	No. 1	None	None	No. 1	No. 1	No. 2	No. 2	None	None	No. 2	None
Antifoam concentration, p.p.m.	0	0.2	2.0	0	0	0.2	2.0	0.2	2.0	2.0	0	2.0	2.0
Residuum volume at zero time, cc.	200	200	200	200	200	200	200	200	200	200	204	204	204
Bubbling Period													
Total vol. after bubbling air for 5 min., cc.	440	250	215	400	....	....	200	....	200	....	....	....	....
Liquid vol. after bubbling air for 5 min., cc.	130	185	195	160	....	....	200	....	200	....	....	....	....
Foam vol. after bubbling air for 5 min., cc.	**310**	**65**	**20**	**240**	**245**	**25**	**0**	**30**	**0**	**45**	**200**	**0**	**100**
Foam vol. as per cent of total bubbling air, %	66	14	4	51	52	5	0	6.4	0	9.6	42.5	0	21.2
Vol. % liquid in foam	22.6	23.0	25.0	16.7	....	....	....	....	....	....	....	....	....
Settling Period													
Foam vol. after 1 min. settling, cc.	310	20	<5	....	....	....	0	....	0	....	....	0	....
Foam vol. after 5 min. settling, cc.	270	<5	<5	120	50	0	0	0	0	0	40	0	0
Foam vol. after 10 min. settling, cc.	255	0	0	30	15	0	0	0	0	0	5	0	0
% of initial foam remaining													
After 1 min. settling	100	31	<25	....	....	....	0	....	0	....	....	0	....
After 5 min. settling	87	<8	<25	50	20	0	0	0	0	0	20	0	0
After 10 min. settling	82	0	0	12.5	6	0	0	0	0	0	2.5	0	0

constant rate of 94 ml. per minute for 5 minutes. The volume of foam produced is measured and the blowing air shut off. After 1, 5, and 10 minutes' settling time, the foam volume is again recorded.

Foaming tendency is indicated by the amount of foam produced when air is bubbled through the residuum at a constant rate for 5 minutes.

Foam stability is indicated by the amount of foam remaining at the end of a specified time interval after the bubbling air has been shut off. Intervals are 1, 5, and 10 minutes.

Data in Table 1 show that the asphalt had greater foaming tendency and produced 1.26 to 1.55 times as much foam as the vacuum residuum.

Foam stability of the asphalt was also higher. After 5 minutes' settling, 87% of the asphalt remained compared to 50% for the vacuum residuum. At the end of 10 minutes 82% remained for the asphalt and 12.5% for the residuum.

Calculations based on the data in Table 1 show the potential seriousness of tank frothovers.

For example, since the asphalt foam was 22.6% liquid, each barrel of the asphalt can produce 4.4 bbl. of froth. A 50,000-bbl. tank could produce 220,000 bbl., or 28.2 acre-ft. of froth.

The foam test shows that 82% of the froth still persists 10 minutes after it is generated, and it is estimated that 50% of the froth would be still there 30 minutes after generation.

During the first test in Table 1, 1.52 volumes of air generated 1.0 volume of asphalt foam. Therefore, only 164 bbl. of water would be required to produce the 1,870,000 cu. ft. of steam needed for producing 28.2 acre-ft. of froth from the 50,000 bbl. of oil.

Effect of antifoam. In the presence of 0.2 p.p.m. antifoam, foaming tendency of the asphalt was only one-fifth of that measured with no antifoam. With 2.0 p.p.m. antifoam, foaming tendency was reduced to one-fifteenth that obtained with no antifoam.

Likewise for the vacuum residuum, foaming tendency at 0.2 p.p.m. antifoam concentration was one-tenth that obtained with no antifoam. At 2.0 p.p.m. no foam was produced.

Foam stability was also sharply reduced. The asphalt with no antifoam had shown 100, 87, and 82% of the generated foam persisting after 1, 5, and 10 minutes' settling. The same asphalt with 0.2 p.p.m. antifoam agent showed only 31, 8, and 0% for the same settling intervals.

Tests on the vacuum residuum showed complete foam collapse in 5 minutes' settling with 0.2 p.p.m. antifoam. This compares to only 50% decay in 5 minutes when no antifoam is used.

Antifoam Action Stays

While antifoam was being injected into a vacuum unit, a survey of the foam properties of residual stocks was made to see if antifoam action was retained through a series of processing steps.

The modified ASTM test was run on residual storage-tank samples and streams where the antifoam might be expected to show up if it

remained in the residuum. Fig. 2 shows that antifoam action was still effective in the downstream residual stocks.

Another series of tests showed that it apparently makes little difference whether the antifoam is injected into the vacuum unit, or added directly to residuum.

Antifoam at High Temperature

Antifoam-bearing residuum from the vacuum unit was charged through a heater before it was further vacuum flashed. Coil-outlet temperature on the heater varies from about 820° F. to 860° F. Fig. 2 shows that the residuum from the second vacuum flash showed nearly no foaming tendency and no foam stability.

The silicone antifoam compounds used were reported to be unstable at temperatures of 800° F. or above, with the extent of decomposition depending on time of exposure.

Even though decomposition may take place it appears that antifoam activity is maintained. An example of this is the successful use of silicone antifoam agent in coking drums where high temperatures and long residence times are used. It may be that the thermal decomposition products of the silicone antifoam are also antifoam agents.

Settling Out of Silicone

Silicone antifoam is insoluble in residuum and some concern has been expressed about antifoam separating from the residuum in storage tanks. If separation did occur, silicone antifoam fluid would float on top of residuum stocks of 16° API or lower gravity held in 300°-F. storage. Therefore, the first heave of a tank boilover would probably provide enough agitation to allow the antifoam agent to suppress foaming tendency and stability.

Pilot-Scale Frothovers

To simulate a frothover a series of tests was made using hot asphalt in 55-gal. drums and water or steam injection.

The asphalt used was vacuum residuum blown to Grade AC4 asphalt cement. The modified ASTM foam test on this stock is shown in Table 1.

Residuum for each test was drawn from plant storage as needed. The storage tank was held at about 390° F. by an internally fired heater. This residuum tested 11° API gravity, 197 penetration at 77° F., and a viscosity of 925 S.F.s. at 210° F.

In all tests the containers for the hot residuum were 55-gal. drums with the tops removed.

These tests showed that, if a tank does boil over, antifoam in the proper concentration (about 0.2 p.p.m. for the residuum tested) will prevent the foaming and spreading of the froth outside the tank. The tests also show that, although boilovers cannot be prevented in all cases by use of antifoam agents alone, the quantity of water required to cause a boilover is increased greatly.

Antifoam in Asphalt

Silicone antifoam agents have been in use for many years in the asphalt industry. In some cases they are added to process units to effect cleaner separation of overhead product from the residual. Antifoam agents are also useful to suppress foaming in the loading of asphalt as well as in mixing and spraying.

There are very few data to show the effect of antifoam agents on the field service behavior of asphalt. However, there is a real possibility that the use of a small amount of silicone antifoam in the asphalt may retard volatilization and polymerization during pug-mill mixing with aggregate. Initial hardening of the asphalt would thus be minimized and a longer service life could be expected. Investigations along this line should be encouraged.

A survey was made of state highway departments and Bureau of Public Roads to determine the effect of antifoam agents on the properties of asphalt. Of the 37 highway departments replying, only 1 stated that it did not want antifoam material in bituminous materials supplied to it.

Based on the replies and other available information, it appears that silicone antifoam agents in concentrations from 0.2 to 1,000 p.p.m. have no appreciable effect on the properties of asphalt.

However, the results of certain tests are influenced by the amount of foaming due to the nature of the oil. These tests include the Cleveland Open Cup flash, and tests on the residue from distillation of asphalt cutbacks.[3]

A silicone antifoam agent might be used as a standardizing additive to insure no foaming during test. By adjusting limits accordingly, this would be an effective way to offset the inconsistencies of the test results obtained with these methods.

Several state highway departments did not think that silicone up to 1.0 p.p.m. would significantly affect asphalt properties and therefore would not object to its use. We should bear in mind that some of the data reported involved concentrations up to 1,000 p.p.m., a quantity that appears to be excessive for the purpose discussed in this article.

There is an optimum concentration for any additive material in order to achieve a given result.

In order to obtain maximum benefits from antifoam, exact additive control, accurate records, and careful tests should be made by users of antifoam in every phase of its use. Antifoam agents can be useful tools for the petroleum industry, not only in processing and storage-tank protection, but also offer promise of product improvement.

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MISSOURI RIVER dredging operations. Special type of high-capacity dredge is in foreground. Beyond is smaller type of dredge familiar for river work in the area.

NGP gambles on single-line submerged

THE 30-IN. LINES across the Missouri River were recently completed by Natural Gas Pipeline Co. of America. Reliance on a single well-constructed river crossing for each overland line diverges from earlier practices of the industry for distributing risk over more than one crossing line.

These two lines cross the Missouri between high bluffs on the west bank near Plattsmouth, Neb., and the flood plain on the east side in the Glenwood, Iowa, area. One of the 30-in. crossing lines is a connecting link in a 36-in. overland line. The other is a connecting link in a 24-in. overland line. This link supplants ten 10-in. lines across the river which have been serving the 24-in. line laid in 1930.

Other area crossings. The company also has a 26-in. crossing laid on one side of a highway bridge a short distance upstream from the new 30-in. lines. Northern Natural Gas Co. uses the other side of the highway bridge as pipeline crossing support. Nearby, Northern Natural has a pipeline bridge and also crossing lines laid in the bed of the river.

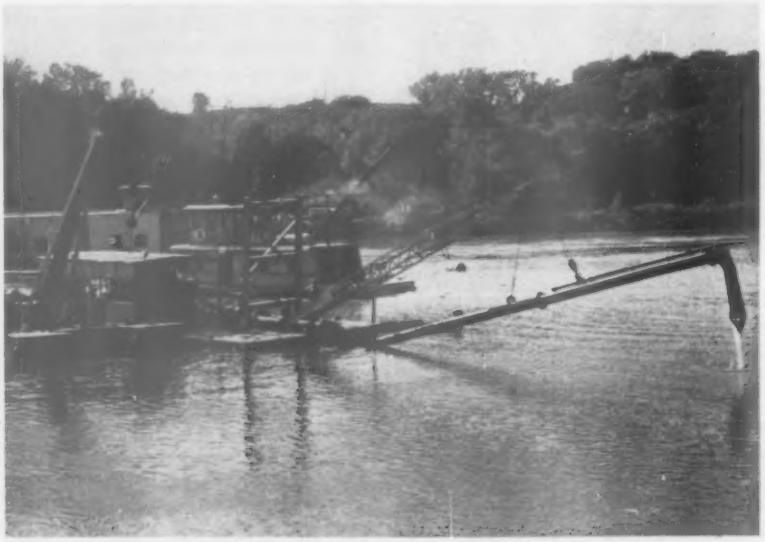
Great Lakes Pipe Line Co. also has been using the river bed for crossing this section of the Missouri, which happens to be one of the big

BY PAUL REED
Pipeline Editor

"pipeline alleys" of the country. This crossing area is an exhibit, indicating 30 years of thinking on river-crossing problems. Some of the lines were laid with an upstream bow, but the present practice is to lay straight across.

Natural Gas Pipeline has never had serious trouble here from river lines washing out. There was some exposure of the 10-in. lines which needed correction when the river cut into the high steep bluff on the west bank of the river. Some leak repairing has been done on the flood plain on the east side.

A specially designed dredge was used by the contractor, Pentzien,



SPECIALLY DESIGNED DREDGE with cutterhead of 800-cu.-yd. per hour capacity.

SMALLER DREDGE with 12-in. plain suction, with plain point, having 200-cu.-yd. per hour capacity.

Missouri River crossings

Inc., in the construction of the new 30-in. crossings. This dredge uses a high-capacity cutterhead typical of dredging equipment usually found on larger hulls with deeper drafts of 5 or 6 ft.

Shallow draft of 3½ to 4 ft., together with high cutterhead capacity, leads to greater versatility for working under a wide range of conditions. The hull of the dredge is 130 by 36 ft. The cutterhead, with 800-cu.-yd. per hour capacity, pumps through a 22-in. suction and 18-in. discharge. The dredge is fabricated in eight sections, 7 ft. deep, to facilitate transporting by truck or rail.

The "ladder" supporting the suction pipe is made in sections so that its length may be adjusted for different needs. Ladder weight is 125,000 lb. Dredging can be done at a depth down to 65 ft.

The dredge has 1,955 hp. in four diesel engines—one 1,600-hp. engine for driving the big pump; two 110-hp. engines for driving generators furnishing power to operate the cutterhead, hoists, spuds, and winches; and a 135-hp. engine for the seal pump which delivers water to the packing glands and primes the big pump.

CEMENT AND AGGREGATE being poured for concrete jacketing near the river.

Crossing Construction

The line approaching the river edge on the west bank is held in place by piling driven beside it on top of the bluff. Ditch on the side of the bluff was cut 25 ft. deep so that it could cross with a 36° slope through the bluff having a slope of 60°.

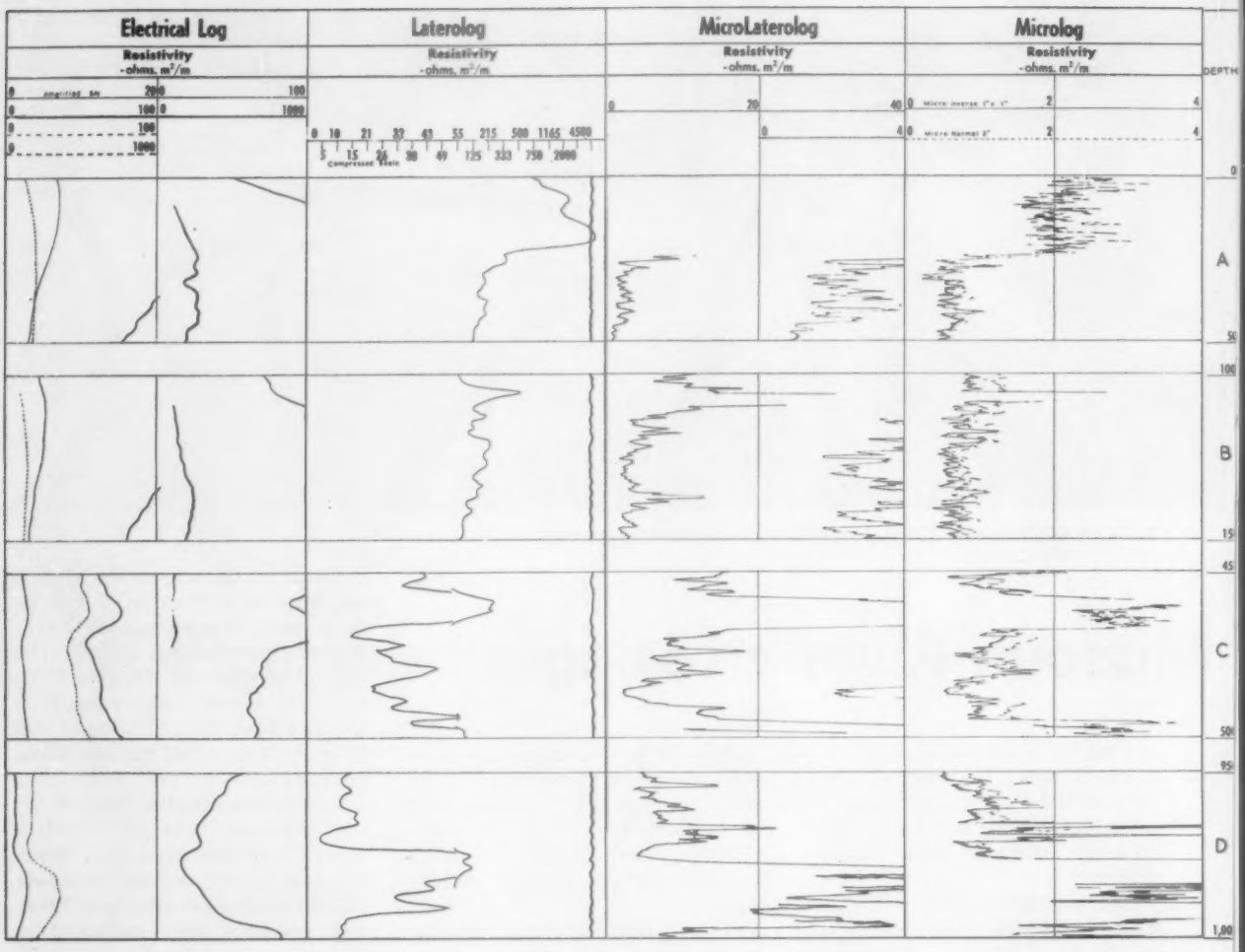
Cover for the pipe on the slope is stabilized by a breaker of two or three layers of sand bags, with timbers on top, slanting upward. The right-of-way on the slope is being terraced. A rock ledge extends in the west bank for a distance of 350 ft. in the area where the two 30-in. lines are laid.

Distance across the river at the two crossings is 1,100 ft. from water's edge to water's edge. Depth of water at the deepest point was 35 ft. Trenches were dredged 200 ft. wide and 18 ft. deep—sufficient for the pipe to be well below mean low water. The stream is swift and carries a considerable volume of river traffic.

Pipe in the river was jacketed with concrete made with a magnetite aggregate 4 in. thick and weighing 140 lb. per cu. ft. On the bank the pipe with coating and concrete jacketing weighed 850 lb. per lineal ft. In the water it had a negative buoyancy of 340 lb. per lineal ft. When the pontoons were attached, negative buoyancy was 40 lb. per lineal ft.

Concrete was applied with the contractor's equipment. Cement was brought to the job in mixing trucks. The trucks loaded a hopper from which concrete was poured in two layers into a form having a thin metal vibrator. Around the pipe were two rolls of No. 17 galvanized reinforcing wire mesh.

Pipe is 5LX-40 and 45, 30-in. ½-in. wall. Coating applied before concrete jacketing was coal tar reinforced with glass mat.



Experience in Southeast Arabia shows How to

Not every log will work in a particular area. This has been the experience of operators in Southeast Arabia, but they found a way to choose those that give the best results. Here is a summary of the methods they used.

BY D. J. CREGEEN
Qatar Petroleum Co., Ltd.

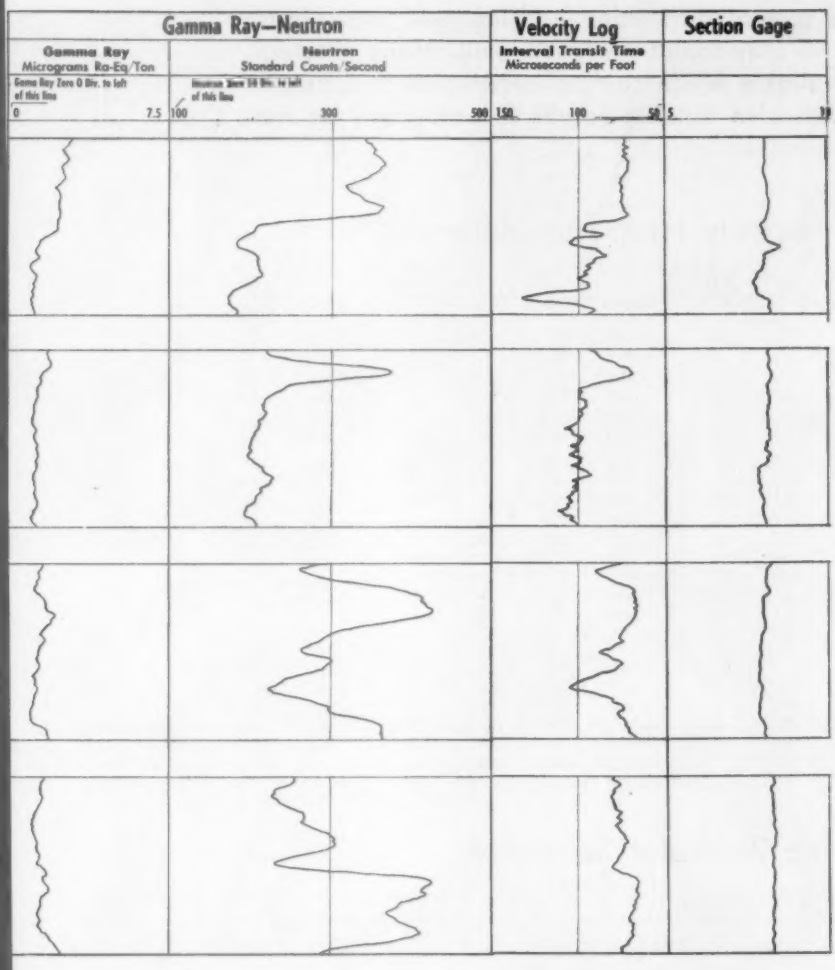
TAKE A FORMATION of highly resistive limestone, sandwich it between layers of anhydrite or dense limestones, and ordinary resistance logs have a tougher-than-usual time spotting oil.

That's the way it is in Southeast Arabia.

In the interpretation of the electrical-resistance log in a sand-shale series, a porous sand is shown by a negative deflection of the self-potential curve, and if the resistivity is high opposite such a sand it can be taken to be hydrocarbon bearing; if it is low, it will be a water sand. The amount of deflection of the self-potential curve depends on the ratio of the resistivity of the filtrate of the drilling mud to the resistivity of the formation water, which is present as connate water.

In the area under review it is found that all formation waters at the depths where oil is found have a salinity in excess of 160,000 p.p.m. The supply of fresh water for mixing drilling mud is limited, and in many cases salt water is used. Even if fresh-water mud is used, as drilling takes place through salt-water formations the mud is contaminated and becomes salty. In such cases it is found that the formation water and mud filtrate have low resistivities, and there is little definition of the self-potential curve.

Apart from this, the behavior of the curve in hard formations is complicated, so that, even if it were possible to use very fresh mud to obtain a large amplitude for the de-



SEVERAL LOGS were run in four 50-ft. sections of a recently drilled well in order to show which gave the best results. While specific reference is made to logging problems in Southeast Arabia, this method of analysis will work in all areas. Fig. 1.

choose the right log

flection, it still would not be possible easily to distinguish the porous beds, where hydrocarbons may be found.

Curves giving the formation resistivities are also difficult to interpret. The sections where oil is found have high resistivities, but so, too, do the neighboring tight sections. And lower resistivities may mean either a water sand or the presence of shale. Even the boundaries of beds are not clearly distinguished and cause trouble in correlations between wells.

In an effort to solve the problem of logging hard formations the limestone sonde had been devised, and was run in some early wells. However, the results from this log were also unsatisfactory, and it became usual not to run logs.

With the advent of more modern devices, such as focused logs, MicroLogs, and radiation logs, efforts were made to assess their usefulness. Two wells were cored with oil-base mud (so that water saturations could be found from core analysis for comparison with results from logging). Then the logs which could be used in this type of mud were run. The mud system was changed to lime-base and a full series of all the then-available logs was made. Unfortunately, these were affected by the oil-base mud cake adhering to the side of the hole and the advantages of the new logs were not immediately apparent.

Later on, logs were run under more normal conditions and their accuracy established. It is now general to run a full set of appropriate logs whenever possible and it is felt that they can be interpreted quantitively.

Present methods. Logs over four 50-ft. intervals from a recent well are shown in Fig. 1. They comprise the following:

1. Electrical log (16-in. and 64-in. normals, 18 ft. 8 in. Lateral, SP).
2. Laterolog.
3. MicroLog.
4. MicroLaterolog.
5. Gamma ray—Neutron log.
6. Sonic log (C.V.L.)
7. Section gage.

The electrical log, as has already been shown, is of limited value. However, it is still run to correlate with older wells.

The Laterolog gives the best value for the true resistivity of the formation, needed to find water saturation.

As the MicroLog is not adapted for use with low-resistivity muds because of their bypassing effect, the use of this curve for quantitative interpretation is not general. However, it gives an excellent qualitative picture of any porous intervals which are present.

For quantitative porosity determination, the MicroLaterolog is available. Mud resistivities which are extremely low do not adversely affect this log because of its focusing effect.

With definition of the SP curve being poor, presence of shale is found from the gamma-ray curve. Both clean limestones and shaly limestones are present. In the latter case the gamma-ray reading is used to correct neutron and sonic readings for the presence of shale in the formation.

The neutron and sonic curves are used for porosity determination. In other areas these curves may sometimes be used to determine whether any hydrocarbons present are gas or oil. As the sonic log is a recent introduction and has not yet been run in many wells, there is not enough information about its use in

"Every area has its special difficulties in using well logging to locate formations which may contain producible oil. Many different types of logs are available which can be interpreted in different ways and those which give reliable results in one place do not necessarily do so in another."

Table 1–Porosity From Microlaterolog

Depth	R_{MLL}	F_{MLL}	ϕ (RHS =30%)
0-22	>40	...	....
24	6.0	140	12
26	1.8	42	22
28	3.8	88	15
30	3.0	70	17
32	1.6	37	23½
34	2.2	51	20
36	2.8	65	18
38	2.8	65	18
40	1.6	37	23½
42	1.9	44	21½
44	2.5	58	19
46	1.0	23	30
48	1.0	23	30
50	1.0	23	30
100	10	230	9
102	95	221	10
104	11	246	9
106	15	340	8
108	>40	...	....
110	11	256	9
112	80	286	10
114	3.2	74	17
116	5.0	116	13
118	10	233	9
120	3.0	70	17
122	6.0	140	12
124	2.6	60	19
126	1.8	42	22
128	2.2	51	20
130	2.6	60	19
132	2.6	130	13
134	3.6	200	10
136	6.5	160	11
138	5.5	140	12
140	3.2	100	14
142	2.2	130	13
144	2.5	58	19
146	4.0	93	15
148	2.0	47	21
150	3.0	70	17
450	18	419	7
452	13.5	314	8
454	14.5	337	8
456	16.5	384	7
458	15.5	360	7
460	>40	...	....
462	>40	...	....
464	>40	...	....
466	>40	...	....
468	15.5	360	7
470	13.5	314	8
472	8.2	191	10
474	10.2	237	9
476	8.0	186	10
478	10.0	233	9
480	9.5	221	10
482	10.5	244	9
484	7.4	172	11
486	2.4	56	19
488	2.4	56	19
490	5.2	121	13
492	15.8	367	7
494	12.5	291	8
496	30	698	5
498	10.3	240	9
500	33	767	5
950	5	116	13
952	5	116	13
954	12	279	9
956	4	93	15
958	5.5	128	13
960	9.0	209	10
962	7.5	174	11
964	7.0	163	11
966	6.5	151	12
968	12	279	9
970	14	326	8
972	10	233	9
974	5	116	13
976	4.5	105	14
978	20	465	7
980	>40	...	....
982	28	651	5
984	>40	...	....
986	32	744	5
988	24	558	6
990	>40	...	....
992	19	442	7
994	28	651	5
996	38	884	5
998	10.5	244	9
1,000	8	186	10

Table 2–Water Saturation

Depth	R_{LL}	ϕ	F	FR_ω / R_{LL}	S_ω%
0	....	...	...	.....	...
2	....	...	...	.....	...
4	....	...	...	.....	...
6	....	...	...	.....	...
8	....	...	...	.....	...
10	....	...	...	.....	...
12	....	...	...	.....	...
14	....	...	...	.....	...
16	....	...	...	.....	...
18	....	...	...	.....	...
20	....	...	...	.....	...
22	....	...	...	.....	...
24	2,000	...	...	.....	...
26	1,165	23	19	0.0003	2
28	>4,500	25	...	.....	...
30	1,165	24	18	0.0003	2
32	760	20	25	0.0007	3
34	600	21	21	0.0007	3
36	460	18	32	0.0014	4
38	650	16	40	0.0012	3
40	650	25	16	0.0005	2
42	420	22	21	0.0010	3
44	1,000	24	18	0.0004	2
46	1,050	18	31	0.0006	2
48	1,050	27	14	0.0003	2
50	630	21	23	0.0007	3
100	170	23	19	0.0022	5
102	120	18	31	0.0052	7
104	155	5	400	0.0516	23
106	450	7	210	0.0093	10
108	1,165	16	40	0.0007	3
110	460	24	18	0.0008	3
112	500	30	11	0.0004	2
114	750	29	12	0.0003	2
116	200	25	16	0.0016	4
118	330	24	18	0.0011	3
120	1,000	27	14	0.0003	2
122	1,000	33	9	0.0002	1
124	1,000	27	14	0.0003	2
126	1,160	28	13	0.0002	1
128	1,165	24	18	0.0003	2
130	1,000	28	13	0.0003	2
132	700	25	16	0.0005	2
134	330	27	14	0.0008	3
136	300	20	25	0.0017	4
138	280	22	21	0.0015	4
140	260	23	19	0.0015	4
142	330	30	11	0.0007	3
144	330	30	11	0.0007	3
146	150	28	13	0.0017	4
148	215	28	13	0.0012	4
150	190	31	10	0.0011	3
450	43	7	210	0.0977	31
452	55	17	35	0.0127	11
454	60	20	25	0.0083	9
456	46	14	52	0.0226	15
458	125	...	...	.....	...
460	300	...	...	.....	...
462	340	...	...	.....	...
464	340	3	...	.....	...
466	80	...	...	.....	...
468	35	10	100	0.0571	24
470	23	13	60	0.0522	23
472	26	13	60	0.0462	21
474	51	9	125	0.0490	22
476	36	26	15	0.0083	9
478	46	10	100	0.0435	21
480	55	15	46	0.0167	13
482	60	17	35	0.0117	11
484	60	18	31	0.0103	10
486	44	26	15	0.0068	8
488	40	25	16	0.0080	9
490	43	18	31	0.0144	12
492	55	11	84	0.0305	17
494	55	14	52	0.0189	14
496	56	9	125	0.0446	21
498	43	...	...	.....	...
500	100	...	...	.....	...
950	8	17	35	0.0875	30
952	15	10	100	0.1333	37
954	13	17	35	0.0538	23
956	11	11	84	0.1527	39
958	13	15	46	0.0708	27
960	13	8	160	0.2462	50
962	12	10	100	0.1666	41
964	12	11	84	0.1400	37
966	16	5	400	0.5000	71
968	15	7	210	0.2800	53
970	13	12	70	0.1077	33
972	6	7	210	0.7000	84
974	5	10	100	0.4000	63
976	12	17	35	0.0583	24
978	120	...	...	.....	...
980	100	...	...	.....	...
982	125	...	...	.....	...
984	90	...	...	.....	...
986	46	...	...	.....	...
988	43	...	...	.....	...
990	35	...	...	.....	...
992	32	...	...	.....	...
994	49	...	...	.....	...
996	32	5	400	0.2500	50
998	12	2	...	.....	...
1,000	11	4	640	>1.0	100

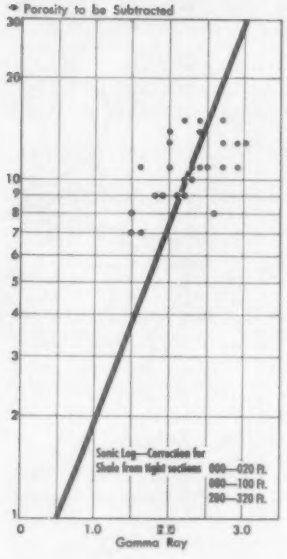


Fig. 2.

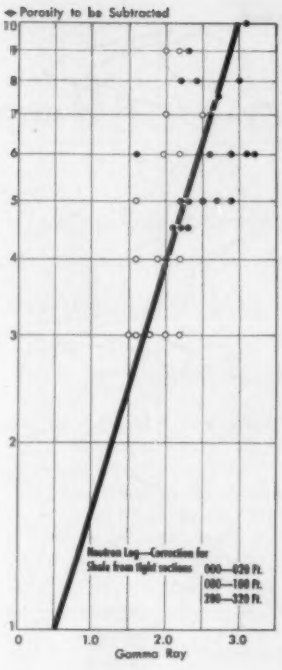


Fig. 3.

LOGARITHMIC RELATIONSHIP exists between gamma-ray reading and the porosity correction to be applied to the sonic log, Fig. 2, and the neutron log, Fig. 3. The plotted points show the specific correction, and the group of points is fairly well bisected by the line representing this logarithmic function.

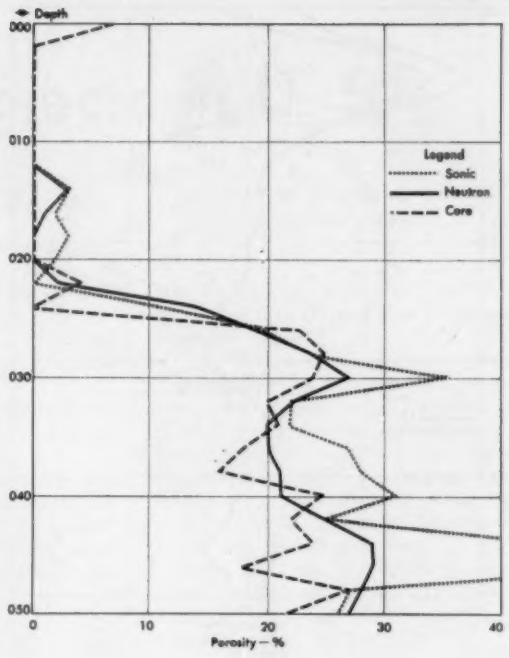


Fig. 4.

POROSITIES from neutron and sonic logs, as well as from core analysis, are shown in Figs. 4, 5, 6, and 7. (Figs. 5, 6, and 7 are on next page).

Southeast Arabia to show whether it can be used to indicate the presence of gas. First results are, however, encouraging.

The section gage is run to correct for hole size, where necessary.

Interpretation. A visual examination of the MicroLog shows any porous zones present.

Then porosities are calculated from: (1) Neutron log; (2) sonic log; (3) MicroLaterolog.

The first two are highly affected by the presence of shale and must be corrected. The gamma-ray curve is used for this purpose. The reading opposite a shale section is noted and also the apparent porosity. It is generally found that the gamma ray has a value of about 4.0 and the porosity value is about 40%. It is then assumed that a reading of 0.5 corresponds to a clean pay and that a logarithmic relationship exists between the readings and the porosity corrections that must be applied to allow for the presence of shale. These relations for the logs shown are given in Figs. 2 and 3. Also plotted are correlations which are shown to be tight by core analysis. While there is scattering of these points it is noted that in both cases the logarithmic relationship bisects the group, confirming the validity of the assumption.

For MicroLaterolog interpretation it is assumed $F = R_{MLL}/R_{mf}$. As the residual hydrocarbon saturation is not known, the porosities are computed with R.H.S. = O, and also one or two other values, and then compared with results.

The Laterolog is used to obtain an approximate value of R_t. It is affected by the presence of shale and invasion of the mud filtrate, both of which tend to lower the reading. It is not possible to use departure curves to estimate Di, and thus correct the Laterolog, as the high resistivities are generally outside the range of published departure curves. If the ratio of the mud-filtrate resistivity to the formation-water resistivity is about 2, the resistivity of the flushed zone is nearly equal to the true resistivity for $S_w = 50\%$. Thus the influence of the filtrate invasion on the Laterolog readings is a minimum at this saturation, and at nearby saturations in the critical region where the production of either hydrocarbons or water is possible. Otherwise it tends to give low readings for the dominant saturation.

Formation factors have been measured in the laboratory on plugs cut from cores and correlated with porosity values. The relationship $F = 1/\phi^2$, which is normal for consolidated formations, appears to be valid.

It is general for the formation water to have a resistivity of about 0.02 ohms m^2/m, or less, at bottomhole temperature. Knowing F, R_w and using $R_{LL} = R_t$, S_w is computed from the usual Archie formula $S_w = (R_t/FR_w)^{1/2}$.

Results. Porosities from the neutron and sonic logs over the four intervals are shown in Figs. 4, 5, 6, and 7. Porosities from core analysis are shown for comparison. Calculations from MicroLaterolog readings are shown in Table 1 with R.H.S. taken as 30%.

Calculations of the water saturations are shown in Table 2.

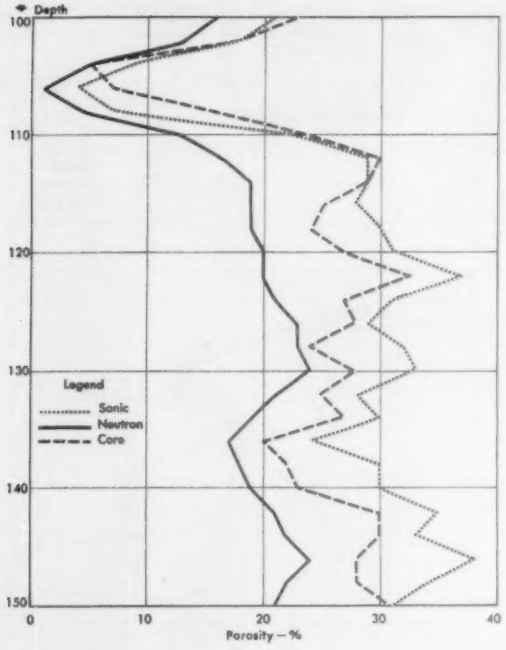


Fig. 5.

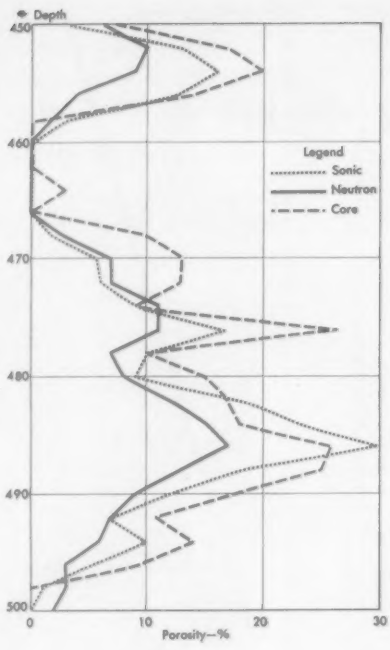


Fig. 6.

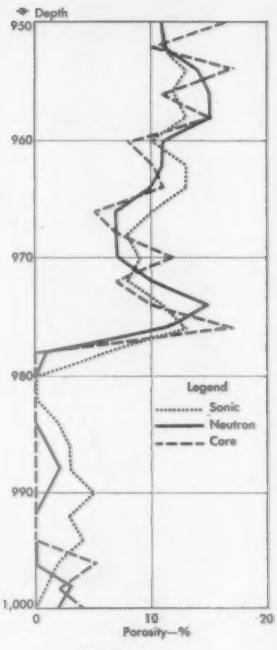


Fig. 7.

Intervals A and B are high-porosity gas formations. In gas zones the sonic porosity is expected to be high and the neutron porosity to be low. The low values calculated from the MicroLaterolog are due to the "flushed" zone not being completely flushed down to the residual saturation, as the filtrate flows away through the fractures which are present.

In interval C it is noted that the logs are unable to fully build up in the thinner intervals as these approach the limits of resolution of the logs.

Interval D is of poorer porosity and is oil bearing. Here the values from core analysis and logs agree reasonably well.

Water saturations from the logs have a low value in porous zones A, B, and C, and as seen above the true values are expected to be even lower. These values were confirmed when either gas or oil was produced on test with no formation water.

In zone D, where S_w has intermediate values, saline oil was produced on test. Generally throughout the area, it is possible to determine where porous zones exist, but the exact determination of the porosity values is much more difficult. No one log is reliable in all ranges of porosities and variations of fluid content. However, a comparison of porosity values calculated from all available logs, together with any core-analysis results available, usually allows a good determination.

Once a fair value of F is obtained, reliable results for S_w are found from the Archie formula. Clean hydrocarbons are produced for low-S_w, saline crude for intermediate, and formations are waterlogged for high values.

An attempt has been made to correlate permeability measurements made on core samples with porosities, but satisfactory results were not obtained. In any case productivity is often due to fractures, and so is indeterminate from the logs.

Conclusion. Every area has its special difficulties in using well logging to locate formations which may contain producible oil. Many different types of logs are available which can be interpreted in different ways, and those which give reliable results in one place do not necessarily do so in another. A careful study must be made to produce a logging program that will provide a maximum of information at a minimum of effort and expense. It is thought that a description of methods used in Southeast Arabia may be of interest to others to assess the usefulness of logs and the best means of interpretation for their own conditions.

Paper presented at Second Arab Petroleum Congress, Beirut, Lebanon.

BOOK

SIMPLIFIED Fr-Y FACTORS, By John P. Squier. Published by John P. Squier Co., Gas Measurement - Engineering Service, Box 6100, Dallas 22, 78 p. $25.

A complete set of combined Reynolds number and expansion factors has been compiled from basic AGA formulas to save time and labor in gas-measurement calculations.

The factors are easily obtained by knowing only the d/D ratio and reading the combined factor directly from headings of line size, gage pressure, and differential. The range of pressures is from 20.0-in. vacuum to 5,000 psig.; the range of the differentials is from zero to 100.0 in. H_2O; and the range of line sizes is from 1.689 i.d. to 29.25 i.d. To condense this information, the tables are based on upstream static connections for pipe taps, and downstream static connections for flange taps.

The tables are especially adaptable to installations where there is a variance in pressures or differentials from day to day, and for operators who incorporate such factors in the hourly meter coefficient. The book contains over 56,000 factors individually computed and combined on data processing equipment.

How to find the

Active water-flood projects in U. S.

Here is a list of publications, pamphlets, brochures, etc., that will tell you where the active floods are, how many wells, production and injection rates, and lots of other things about water-flood projects in the U. S.

BY W. B. BLEAKLEY
Production Editor

"WHERE can I get a list of active water floods in the U. S.?" People have written, phoned, and made personal visits to Journal offices to seek the answer to this question. This compilation of sources has been put together to fill this need for information.

One of the first places to look is the Interstate Oil Compact Commission. The mailing address is Box 3127, Oklahoma City. IOCC has published a pamphlet, "Unitized Oil Field Conservation Projects in The United States," dated January 1, 1959. This lists 777 unit projects in various states, and gives the location, name of reservoir, acreage in the original unit, 1958 oil and gas production, cumulative oil and gas production to January 1959, and the type of project.

Detailed data on other projects may be found from the various state agencies.

ARKANSAS

Factual Data Report—1959. This is an engineer's report on oil and gas reservoirs in the State of Arkansas, including tabulations of discovery wells, development wells, and wildcats drilled during 1959.

Each producing field is covered in detail. Tabulations include location, geology, reservoir properties, oil properties, annual and cumulative production, and reservoir-pressure history.

Only a limited number of copies of the report is available, and distribution is restricted to companies operating in the state.

Write Edward A. Albares, Director, Arkansas Oil and Gas Commission, Oil and Gas Commission Building, El Dorado, Ark.

CALIFORNIA

Summary of Operations—California Oil Fields. Vol. 45, No. 2. Contains numerous statistical tables on reserves, wells drilled, wells abandoned, etc. Table 5 on page 77 of this booklet is a list of all water-flood projects, with statistics.

Write E. H. Musser, State Oil and Gas Supervisor, State of California Department of Natural Resources, Division of Oil and Gas, 205 Golden Gate Avenue, San Francisco. No charge.

COLORADO

Mineral Resources of Colorado, First Sequel. This publication contains a complete detailed report of each field with injection operations. Also included is a brief history of each field, with performance curves.

Write State Mineral Resources Board, State Office Building, Denver.

ILLINOIS

Petroleum Industry in Illinois, 1959 Bulletin 88—Part II. This report supplements previous annual summaries on water-flood operations in Illinois. Data in the report include the project name, location, operator, producing formation, production and injection statistics, number of acres, injection-water properties, and reservoir properties.

Write Illinois State Geological Survey, Urbana, Ill. 50 cents.

INDIANA

Summary of Water-Flood Operations in Indiana, to 1957 is available from Interstate Oil Compact Commission, Box 3127, Oklahoma City. This bulletin contains a list of active water-flood projects, and a brief description of each. Supplies of this publication may be limited.

If unavailable from IOCC, write H. R. Brown, Director, State of Indiana Department of Conservation, 311 W. Washington Street, Indianapolis.

KANSAS

Data on secondary recovery projects in Kansas, 1959, are available under the title **Oil and Gas Investigations No. 20.**

This folded table, delivered in a manila envelope, contains field, operator, and project names as well as data on depth, number of wells, water source, injection and production rates, etc. Major headings on the table are county names, and detailed location of each project in the county, by section, range, and township is given.

Write to University of Kansas, State Geological Survey, Lawrence, Kans. 25 cents, payable to State Geological Survey.

KENTUCKY

Summary of Secondary-Recovery Operations in Kentucky in 1957. This 8½ by 11 pamphlet contains lists of counties and geological formations producing oil by secondary recovery, and a map showing locations of oil and gas pools. Also included is a stratigraphic section for eastern Kentucky and a type log from the western part of the state.

A large table gives information on secondary-recovery projects. Part 1 covers eastern Kentucky, and Part 2 the western portion. This table is very complete. All possible information relating to the floods is included.

Write to University of Kentucky, Kentucky Geological Survey, 307 Mineral Industries Building, Lexington, Ky. $1 plus 10% for postage and handling and 3% for Kentucky state sales tax. If first-class mailing is desired, add 20% for postage and handling.

LOUISIANA

Secondary-Recovery and Pressure-Maintenance Operations in Louisiana, 1959 Report. Booklet contains a listing and index map of all secondary-recovery and pressure-maintenance projects, a detailed history of these fields, and a statistical table of production, injection, reservoir properties, and other data.

Write Ashton J. Mouton, Commissioner, Department of Conservation, Box 4275, State Capitol Station, Baton Rouge, La. No charge.

MISSISSIPPI

There are no active water-flood projects in Mississippi at this time, except for a pilot flood in Wayne County, according to the Mississippi State Oil and Gas Board.

MONTANA

The Oil and Gas Conservation Commission of the State Of Montana provided the information in Table 1.

NEBRASKA

The Oil and Gas Conservation Commission of the State of Nebraska has provided the data in Table 2, Secondary Recovery Projects as of December 1, 1960.

Additional information may be had on request. Write to H. N. Rhodes, Director, Oil and Gas Conservation Commission, Box 105, Sidney, Neb.

NEW MEXICO

Southeastern New Mexico Secondary Recovery Projects as of December 31, 1959 and supplementary table of projects started during 1960.

This four-page mimeographed table, 8½ by 14 in., is broken down by counties and lists project name, operator, and producing formation. For each project the following items are given: average depth, number of acres, average pay thickness and pressure, number of injection and producing wells, cumulative injection (gas or water), cumulative oil, gas, and water production, cumulative oil recovery per acre and the date project started.

Write A. L. Porter, Jr., Secretary, Oil Conservation Commission, Box 871, Santa Fe, N. M.

NORTH DAKOTA

Active water flood projects in North Dakota are:

North Westhope field, Bottineau County.

Tioga and Beaver Lodge fields, Williams, Mountrail and Burke counties.

OHIO

The State of Ohio, Department of Industrial Relations, Division of Mines provided the information in Table 3.

OKLAHOMA

Listings of water floods in Oklahoma must be obtained from commercial publishers. There are no state documents available for this purpose.

Oil-Law Records Corp. Publication lists location, zone, type of project, order number, effective date, application number, and operator. Report is sold on an annual basis, with monthly revisions. Basic book is brought up to date annually, incorporating all changes that appeared on the monthly supplements during the previous year. First year $55. Annual maintenance, after first year, $20.

Write Oil-Law Records Corp., 228 Leonhardt Building, Oklahoma City.

Research Oil Reports lists county, pool, formation, operator, producing formation, depth, area, number of input and oil wells, injection and production rates. Also included is production by months for the year preceding publication. Published annually in August. Same firm prints a daily report that is sold on a subscription basis.

Annual publication, $20 to nonsubscribers. Price to subscribers available on request. Write: Research Oil Reports, 904 Commerce Exchange Building, Oklahoma City.

Vance Rowe Reports include field or project name, operator, location, number of wells, monthly production for last 6 months, cumulative production, and pipeline connection. Published semiannually at $50 per issue.

TABLE 1—ACTIVE WATER-FLOOD AND PRESSURE-MAINTENANCE PROJECTS IN MONTANA

Field	County	Operator	Type Project
Cabin Creek	Fallon	Shell	Secondary recovery
Cat Creek	Petroleum	Continental	Secondary recovery
East Poplar	Roosevelt	Murphy Corp.	Pressure Maintenance
Kevin-Sunburst	Toole	Imperial-Craig Co.	Secondary recovery
Kevin-Sunburst	Toole	Northwest Prod. Corp.	Secondary recovery
Pennel	Fallon	Shell	Secondary recovery
Pine	Wibaux	Shell	Secondary recovery

TABLE 2—SECONDARY-RECOVERY PROJECTS IN NEBRASKA AS OF DECEMBER 1, 1960

Project	Location	Operator	Daily injection rate	Zone flooded	Injection wells used	Producing wells
Allely	12n-55w, Kimball County	Alwaco, Inc.	.....	J	1	3
Barrett	16-17n-56w, Kimball and Banner counties	Pan American	3,700	J	4	20
Brinkerhoff	17n-56w, Banner County	Pan American	2,000	J	1	9-3
Dietz	13n-55w, Kimball County	Shoreline	1,000	J	6	9
Doran Farms (gas recycle)	14n-50w, Cheyenne County	Ohio	2,000 M.c.f.d.	D	1	15
East Willson Ranch	17n-53w, Banner County	British American	*4,800	J_1 & J_2	3	12
Edwards	18n-56w, Banner County	Pan American	1,500	J	3	9
Enders	13n-55w, Kimball County	Shoreline	3,300	J	7	23-18
Engelland	15n-49w, Cheyenne County	S. D. Johnson	2,000	D & J	3	7
Gehrke	14n-57w, Kimball County	Pan American	2,000	J	2	6
Goodwin	13n-54w, Kimball County	Vaughy & Vaughy	.....	J	1	3
Harrisburg	18n-55w, Banner County	Pan American	3,000	D & J	5	19-23
Jacinto (Travis)	16n-54w, Kimball County	Shell	4,000	J	2	18
Johnson (miscible)	14n-49w, Cheyenne County	Ohio	50 wtr 1,500 M.c.f.	J	1 wtr 1 gas	4
Kimball	14-15n-55-56w, Kimball County	Pan American	7,000	J	5	36
Lane	17n-45w, Cheyenne	Ohio	*5,000	J	2	9
Lewis	18n-56w, Banner County	Pan American	1,400	J	3	11
Lindberg	17n-52w, Morrill County	Skelly	350	J	1	4
Long	12n-55w, Kimball County	Socony Mobil	*8,500	D	8	28
Ostgren	16-17n-54w and 16n-55w, Kimball and Banner counties	Pan American	1,800	J	2	7
Petroleum State	18n-56w, Banner County	Petroleum, Inc.	1,000	D	2	14
S. W. Potter	13-14n-53w, Kimball and Cheyenne counties	Shell	7,000	D	20	12-21
Pumpkin Creek (Mosier)	19n-53w, Banner County	Shell	400	J	2	3
Sloss	14n-55w, Kimball County	Pan American	12,000	J	21	72-61
Vedeae	17-18n-56w, Banner County	Pan American	3,000	D & J	3	17

*Anticipated injection rate.

Write Vance Rowe Reports, 216 Midco Building, Tulsa.

PENNSYLVANIA

History, Present Status and Future Possibilities of Secondary-Recovery Operations in Pennsylvania Bulletin M 41. By William S. Lytle. This pamphlet contains an indexed map and list of fields under secondary recovery, and a discussion of the several types of recovery operations. There are no statistical data on production rates, recoveries, injection rates, etc.

Write Topographic and Geologic Survey, Department of Internal Affairs, Harrisburg, Pa. No charge. Also available is a list of publications.

TEXAS

A Survey of Secondary Recovery and Pressure Maintenance Operations in Texas to 1958. Summary data for 258 injection projects initiated since the latter part of 1958, and supplemental data on 632 projects reported earlier are presented in tabular form with selected performance curves.

Write Interstate Oil Compact Commission, Box 3127, Oklahoma City. $2.

WYOMING

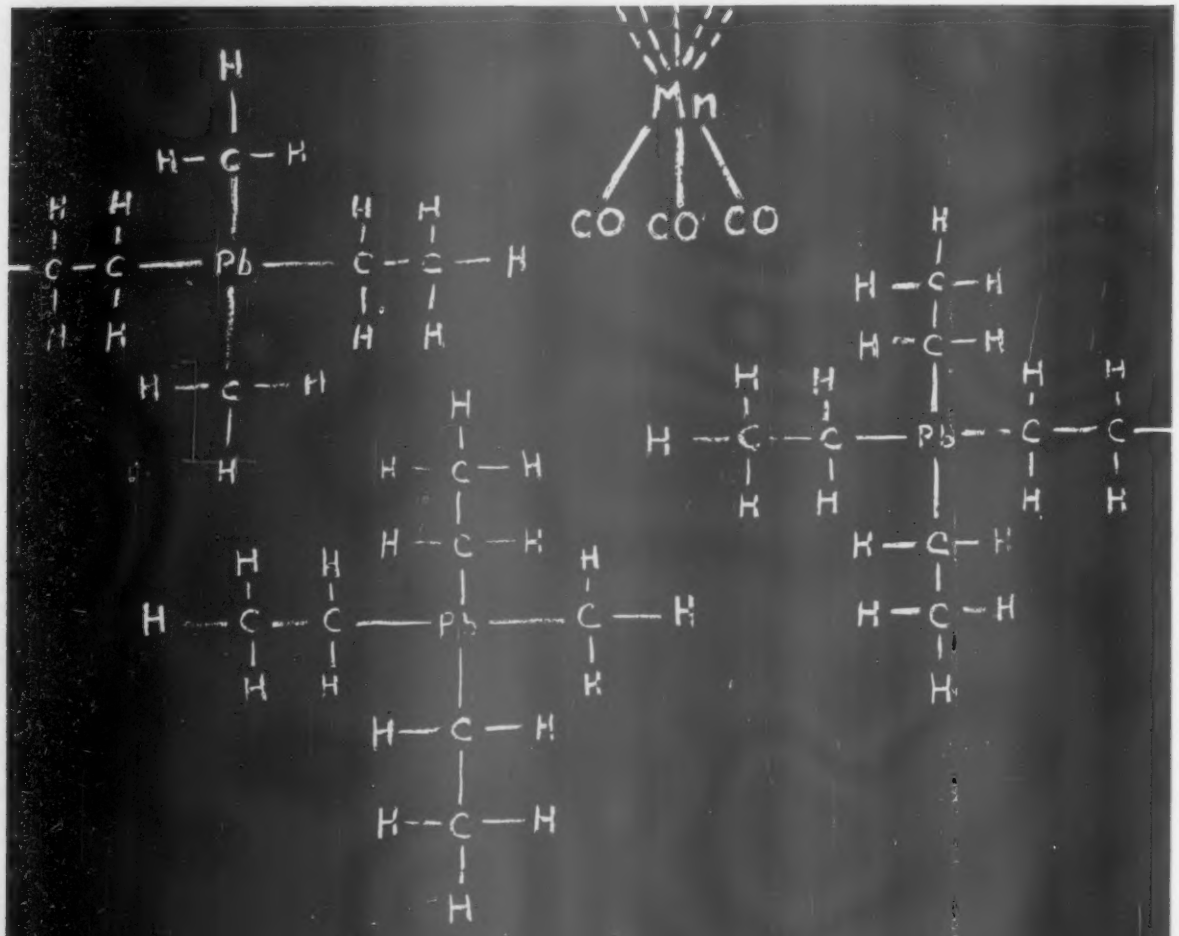
Active water-flood projects in Wyoming are listed in Table 4.

TABLE 4—ACTIVE WATER-FLOOD PROJECTS IN WYOMING

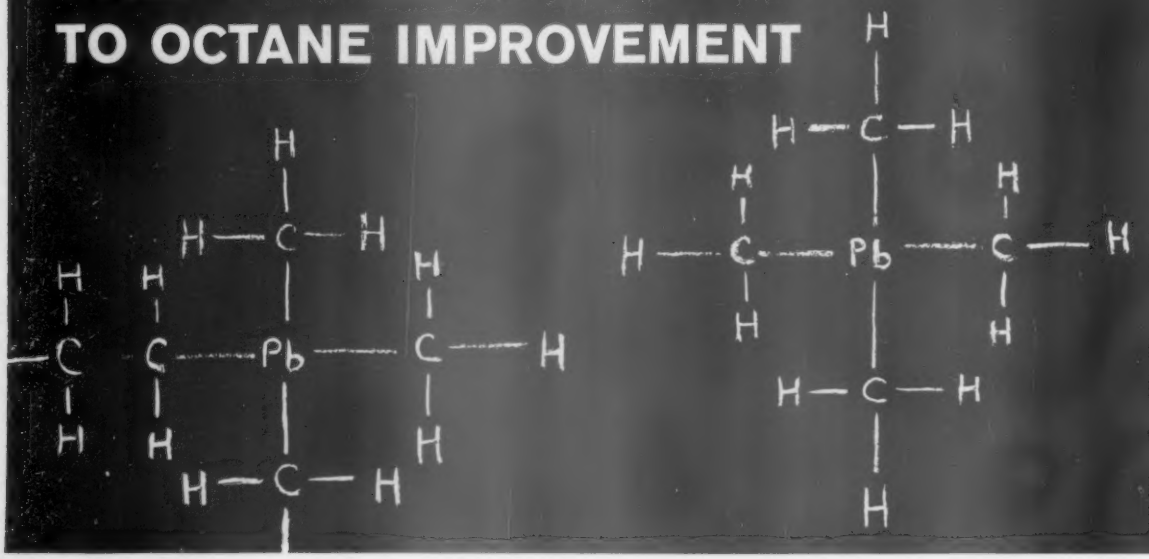
Field	Formation	Type		Operator
Bison Basin	Frontier	Pilot flood	1959	Gulf Oil Corp.
Beaver Creek	Madison	Water flood	1958	Pan American Petroleum
Big Muddy	Frontier	Water flood	1957	Continental Oil Co.
Big Muddy	Dakota	Water flood	1958	Continental Oil Co.
Black Thunder (part of Greater Clareton)	Newcastle	Water flood	1960	True Oil Co.
Clareton	Newcastle	Pilot flood	1958	Kirby Petroleum Co.
Clareton, NE	Newcastle	Water flood	1959	Otis Oil & Gas Corp.
Cole Creek and Cole Creek, South	Shannon	Water flood		Mobil Producing
Cottonwood	Phosphoria	Pilot flood	1959	Pan American Petroleum
Fiddler Creek	Newcastle	Water flood		Trigood Oil & Texaco Inc.
Grass Creek	Curtis	Water flood	1959	Ohio Oil Co.
Greybull	Peay	Pilot flood		Producing Properties, Inc.
Happy Springs	Frontier	Pilot flood		Sinclair Oil Co.
Hay Creek	Newcastle	Pilot flood		Sioux Oil Co.
Lance Creek	First Sundance	Pilot flood	1960	Ohio Oil Co.
Lance Creek	Basal Sundance	Water flood		Ohio Oil Co.
Lance Creek	Morrison	Pilot flood	1959	Ohio Oil Co.
Lost Soldier	Frontier and Tensleep	Pilot flood	1958	Sinclair Oil & Gas Co.
Meadow Creek	Shannon	Water flood		Continental Oil Co.
Meadow Creek, North	Shannon	Water flood		Continental Oil Co.
Mule Creek	Minnelusa	Pilot flood	1958	Mule Creek Oil Co.
Mush Creek	Newcastle	Pilot flood		Texaco Inc.
Mush Creek, West	Newcastle	Pilot flood	1960	Hodge, Walker, Turk No. 6, Ltd.
Oregon Basin, South	Tensleep	Pilot flood	1958	Ohio Oil Co.
Osage	Newcastle	Pilot flood	1958	Coronado Co.
Osage	Newcastle	Pilot flood	1959	Relco, Inc.
Osage	Newcastle	Pilot flood	1960	E. O. McGlothlin
Quealy Dome	Tensleep	Water flood		The California Co.
Salt Creek	First Wall Creek	Water flood		Pan American Petroleum
Skull Creek	Newcastle	Water flood		Otis Oil & Gas Co.
Sussex	Shannon	Water flood	1958	Continental Oil Co.
Sussex	Shannon and Sussex	Water flood Multiple zone	1958	Continental Oil Co.
Torchlight	Tensleep	Water flood	1958	Pan American Petroleum
Wertz Dome	Tensleep	Pilot flood		Sinclair Oil & Gas Co.
West Sussex	Shannon	Water flood	1959	Continental Oil Co.
Worland	Embar	Water flood		Pure Oil Co.

TABLE 3—STATE OF OHIO ACTIVE WATER-FLOOD OPERATIONS—1960

Company—	No. of farms	Sect.	Township	Sand
Ashland County:				
Loudon Pipe Line Co., Box 111, Wooster, Ohio	2	26 & 27	Perry	Berea
Peake Petroleum Co., 1310 Williamson Bldg., Cleveland	3	17	Perry	Berea
L. E. Sherer et al., 125 W. Church St., Marion, Ohio	4	15 & 22	Jackson	Berea
E. C. Smalley, 267 Sloan Ave., Ashland, Ohio	1	4	Perry	Berea
E. C. Ware Drilling Co., Beatty, Ky.	2	4	Perry	Berea
Carroll County				
Kiel and Company, Amsterdam, Ohio	3	7	Loudon	Berea
Coshocton County:				
Natol Corp., Box 151, Newark, Ohio	1	4	Pike	Clinton
Fairfield County:				
National Gas & Oil Corp., Box 151, Newark, Ohio	6	23 & 14	Walnut	Clinton
Knox County:				
Mid-East Oil Co., Box 692, Zanesville, Ohio	1	L. 24 & 25	Jackson	Clinton
Licking County:				
Oxford Oil Co., Box 987, Zanesville, Ohio	1	L. 24	Hopewell	Clinton
Pure Oil Co., Box 311, Olney, Ill.	1	4th Q.	Hanover	Clinton
Lorain County:				
Keith Dibble, Box 293, Lodi, Ohio	2	L. 25	Penfield	Berea
Medina County:				
Baldwin Producing Co., Rt. 5, Medina, Ohio	21	..	Chatham	Berea
Dymo Oil Corp., 101 N. Union, Olean, N. Y.	13	..	Chatham	Berea
Iseman Oil Co., Lodi, Ohio	7	..	Chatham	Berea
George F. Kyser, 354 E. Quaker St., Orchard Park, N. Y.	3	..	Chatham	Berea
Preston Oil Co., 99 N. Front St., Columbus 15, Ohio	5	..	Chatham	Berea
Scott & Siler, 1231 Wooster St., Ashland, Ohio	1	..	Chatham	Berea
Spemack Co., Valley City, Ohio	1	..	Chatham	Berea
Monroe County:				
Barron Kidd, Sistersville, W. Va.	3	15 & 16	Perry	Keener
Pure Oil Co., Box 311, Olney, Ill.	1	21	Center	Keener
Muskingum County:				
Oxford Oil Co., Box 987, Zanesville, Ohio	7	11	Perry	Clinton
Noble County:				
Har-Ken Oil Co., Dexter City, Ohio	2	12	Jackson	Macksburg 500
Perry County:				
Natol Corp., Box 151, Newark, Ohio	1	13	Thorn	Clinton
Washington County:				
Barron Kidd, Sistersville, W. Va.	1	23 & 29	Liberty	2nd Cow Run
Wayne County:				
Vanson Production Co., 721 Meadows Bldg., Dallas 6, Tex.	1	22	Franklin	Clinton



ANTIKNOCKS ADD A NEW FLEXIBILITY TO OCTANE IMPROVEMENT



RECENT DEVELOPMENTS in antiknock compounds have opened new areas for the refiner to consider. Just as raising the allowable limit of TEL concentration provided more latitude, new antiknocks are now available which permit even greater flexibility.

Tetraethyllead

One of the most important developments in the use of TEL came about during 1959—extending the limit to 4 ml per gallon. As a result, the average premium gasoline refined today can be increased from current levels by one and a half Research octane numbers through TEL alone. Similarly the Motor octane number gain is almost two numbers greater. Furthermore, the Road octane gain from TEL is greater than is indicated by either of the laboratory methods.

In the case of regular gasoline, almost two octane numbers can be gained through increasing TEL from present average concentration to 3 ml. The 4th ml of TEL makes possible additional octane improvement.

Tetramethyllead

Research on tetramethyllead—first of a new group of lead alkyls to be offered commercially—shows that in highly aromatic gasolines or in engines prone to induce fuel segregation in the manifold, TML can be considerably more effective than TEL in its road performance.

Mixed Lead Alkyls

Now three more "Ethyl" antiknock compounds are available: MLA 250, MLA 500 and MLA 750—all produced from mixtures of TML and TEL processed to equilibrium composition. Current tests show that these mixed lead alkyls are selective in their ability to provide superior road performance, dependent upon such factors as fuel composition.

Custom Blends

You may find that a physical mixture of TEL and TML in some special ratio is most effective for your needs. Such "custom blends" are available.

Motor 33 Mix

Another compound, Motor 33 Mix—a manganese-lead antiknock—can supply several additional octane numbers when used in certain fuels.

The Future

With this variety of antiknock compounds, each with its particular value and application, maximum flexibility is offered to the refiner. Not only do the antiknocks offer cost savings and delay capital expenditures, but they can provide benefits that cannot be obtained any other way.

REMINDERS TO REFINERS

Antiknocks are your best octane improvement buy, whether costs are figured on Research, Motor or Road ratings.

Antiknocks give you a Road octane bonus you can't get any other way.

Gasoline sensitivity can be decreased with antiknocks.

Refining flexibility can be increased with antiknocks.

Antiknocks also can reduce or delay capital investment in octane improvement equipment.

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ANTIKNOCK COMPOUND
ETHYL CORPORATION

ETHYL CORPORATION, NEW YORK 17, N.Y. • TULSA • CHICAGO • LOS ANGELES

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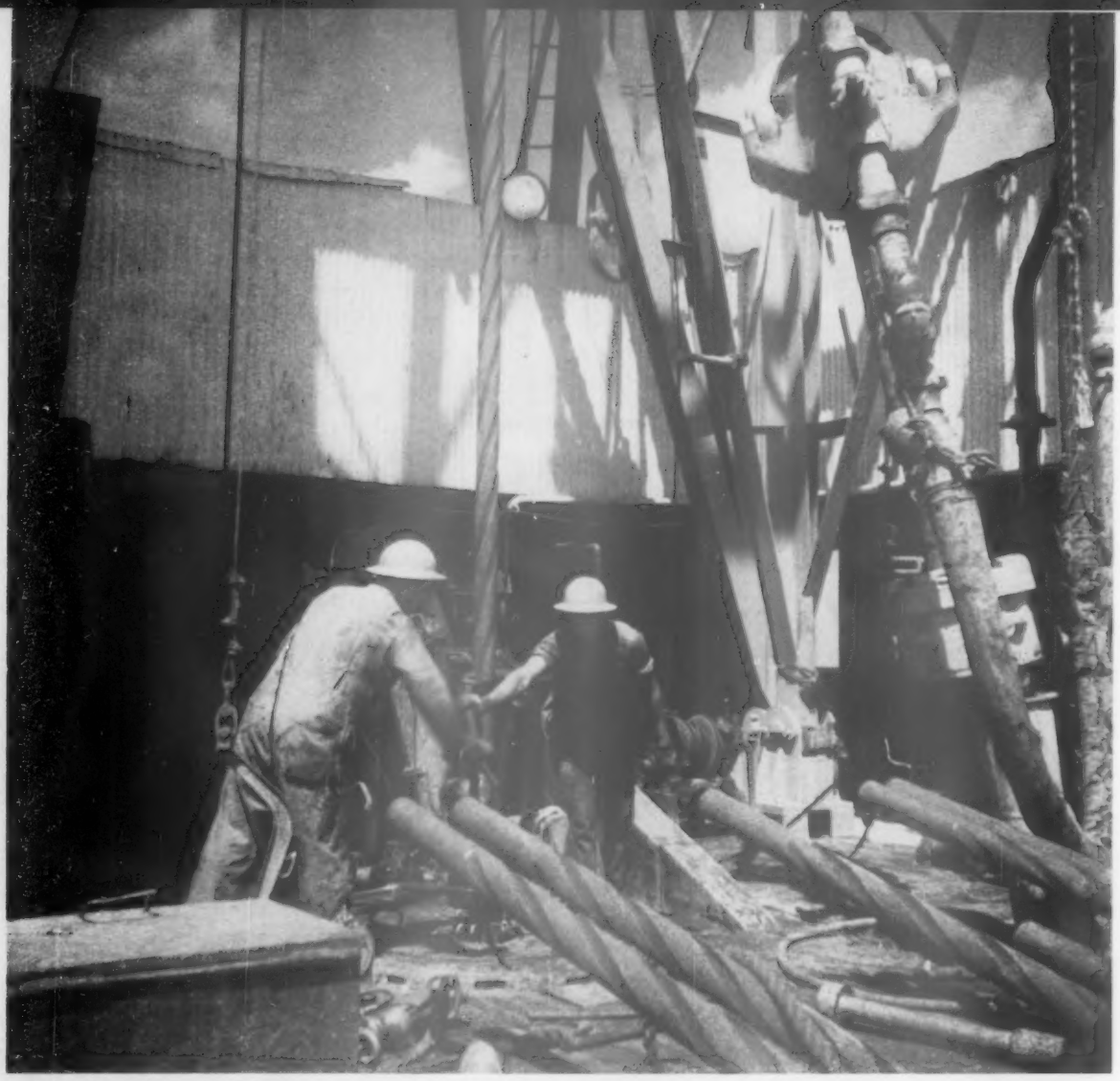


SPIRAL-GROOVED DRILL COLLARS about to be run here are only one way by which . . .

Gulf Coast drillers whip the wall-sticking problem

BY ED McGHEE
Drilling Editor

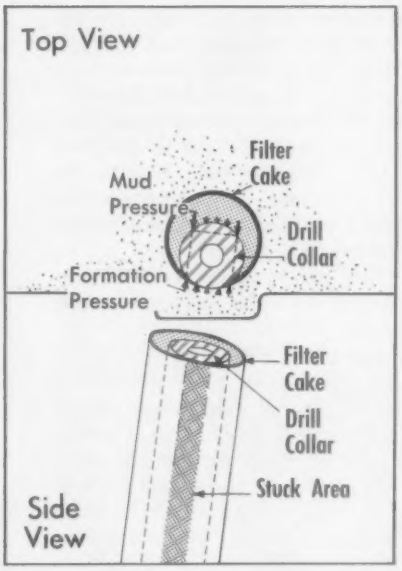
FIVE YEARS AGO, not many drillers had even heard of "wall sticking." Today, most recognize this menace as the cause of at least 75% of the fishing jobs that occur while drilling.

The area worst plagued by wall sticking is the Gulf Coast. What are drillers here doing to prevent wall sticking? What do they do to free the string after they are stuck? They have several good preventives:

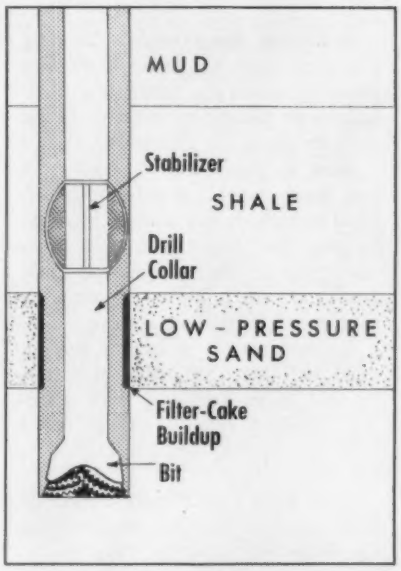
1. They're "living dangerously" by using lighter mud weights than in times past.
2. They are using stabilizers and centralizers even in straight-hole areas.
3. They are using drill collars with a spiral groove cut along the outside diameter.
4. Drillers are being careful to keep the drill string in continuous motion if there's danger of sticking.
5. They are using muds which have wetting agents in them.
6. They are keeping water loss lower and filter cakes thinner in the muds.

If the pipe becomes wall stuck in spite of these precautions, most use a two-step approach to freeing it. First, a special fluid is spotted in the open hole through the interval where the pipe is stuck. Most successful of these fluids have been weighted oil-base mud and weighted invert-emulsion fluids. Then, after waiting 12 or 15 hours, the string

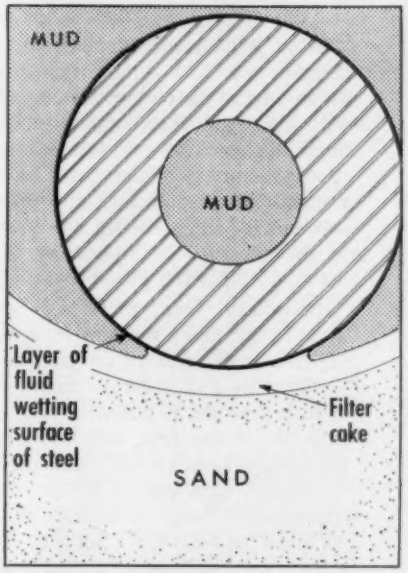
Here is how drillers in the area hardest hit by wall sticking are combating the problem. Gulf coast drillers find that good muds, stabilizers, and special drill collars help to prevent sticking, and spotting special muds helps loosen stuck pipe.



DIFFERENCE IN PRESSURE between borehole and formation forces drill collar in this sketch against hole wall. Collar is held with enough force that it cannot be pulled loose readily. This is wall sticking. Note filter cake on hole walls; it is held by same force that holds collar.



FIRST REMEDY, STABILIZERS, overcome wall sticking by holding the string away from the walls of the hole. Like filter-cake buildup, wall sticking occurs only on the face of permeable formation, in this case a sand. Stabilizers are needed through entire collar string to prevent sticking.



WETTING AGENTS put thin film of fluid around surface of drill collar. Most believe that pressure is transmitted through this film, thus equalizing pressure even where collar is embedded in filter cake. Such wetting agents are used beforehand to prevent sticking, afterwards to free string.

is jarred. In the majority of cases, the pipe comes free and there is no need for washing over.

While sticking is common on the Gulf Coast, the problem has nothing to do with geography. It is a matter of the weight of the mud used. The heavier the mud, the more likely sticking becomes. Depth of the well also has its effect; the deeper the well, the more likely it is that conditions will be ripe to stick the drill string.

Since heavy muds and deep wells are common on the Gulf Coast, there is a lot of wall sticking. But, the same problem can occur anywhere else in the world.[1]

A pressure differential. Basis of wall sticking is simple: pressure in the well bore is higher than it is in surrounding formations. That is, there is a pressure differential from the well bore into the formation. If this weren't true, the well would blow out. It is this same pressure differential which builds up and holds a filter cake against the face of permeable formations.

Consider for a moment a drill collar resting against the wall of the hole. Where this collar touches the wall. it constitutes what you might think of as a big "particle" imbedded in the filter cake. The pressure in the well bore forces this particle against the wall of the hole just as it does the rest of the filter cake. Only the pressure in the formation resists this force. If wellbore pressure is enough higher than formation pressure, the collar is forced against the wall hard enough that it can't be pulled loose readily.

We have spoken only of drill collars. Of course, drill pipe, casing, liners, and wash pipe can become stuck in precisely the same fashion. Drill pipe isn't stuck so often as collars since the pipe is smaller and since the tool joints hold it away from the wall of the hole near the ends. Casing and liners often carry centralizers which prevent their contacting the hole wall. Wash pipe has no such protection; it can, and does, become stuck often if allowed to come to rest for more than a few seconds.

How can you tell the string is wall stuck? If you can still freely circulate mud and if there is no strong reason to suspect other causes, you can assume in almost all cases that you are wall stuck.

Only on sand faces. It's common knowledge in the drilling business,

of course, that no filter cake builds up on shales or other impermeable formations. The cake exists only on the face of sands and other permeable rocks. For the same reasons, there's no tendency for drill collars to wall stick anywhere except in front of permeable beds. On the Gulf Coast the permeable formations are all sands. As a result, all sticking is on the face of sand formations.

How hard a drill collar sticks depends on two things: (1) how much area of the collar is in contact with the sand face, and (2) how much higher well pressure is than sand pressure. It's the same basic principle that applies to any pressure-exerted force: the force is equal to the pressure multiplied by the area on which the pressure works.

Obviously, then, there are two ways to cut down on wall sticking: (1) reduce the area of contact, and (2) keep mud pressure as near formation pressure as practical. As an example of the first, consider that big collars have always stuck more frequently than small collars; the small collars have less contact area. As an example of the second, it's a fact that no one ever got wall stuck drilling with air and it's doubtful that anyone ever wall stuck a string in a water-drilled hole.

Wetting, important function. It might appear at first that in wall sticking mud is important only because of its weight. This isn't entirely true. Most Gulf Coast drilling engineers believe that if the mud contains wetting agents, it has an effect similar to cutting down on the area of contact. The wetting agents, they say, allow pressure in the well to be transmitted around the drill collar even where it lies embedded in the filter cake against the wall of the hole. This transmission of pressure may be through the thin film of fluid that adheres to the surface of the collar as a result of the wetting agent. There may even be some transmission of pressure through the liquid in the filter cake itself.

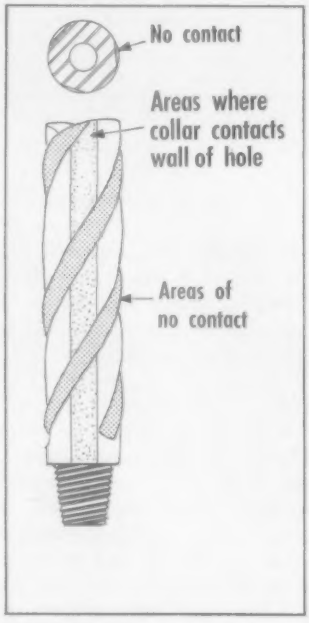
These are the reasons that special wetting agents are now being added to many Gulf Coast muds.[2] Several companies report that stuck pipe has been much less frequent in wells drilled with such muds.

It is for the same reasons that more invert-emulsion muds and oil-base muds are being used than ever before. One operator says the tendency to wall stick almost completely disappears when the hole is full of oil-base mud or invert-emulsion. But even if such fluids are not used, there are still several excellent ways to reduce wall sticking.

Is it living dangerously? The only practical way to bring well-bore pressure closer to formation pressure is to reduce the weight of the mud in the hole. Of course there's a limit in every hole to just how low mud weight can be reduced. Mud must be heavy enough to overbalance the highest formation pressure open to the hole at the time. Just how much higher it must be is a question hard to resolve.

If mud weight is higher than it need be, there are other penalties besides more frequent wall sticking. Drilling rate is slower, mud bills are higher, and circulation is lost more often.

Most Gulf Coast drillers concede that often in the past mud weight has been much higher than necessary for safety. Recognizing this, one major company has made drastic changes in its mud programs. In one area of South Louisiana the company now keeps its mud weight at about 10 lb. per gallon until the well kicks. Then and only then is mud weight raised. Then and only then is intermediate pipe set.



SPIRAL - GROOVED drill collars reduce area of contact between collar and hole walls. Grooves are not concave, but flat. As a result, there's no tendency for cuttings to ball up and bag-type preventer will seal on collar. Grooves cause little loss of stiffness and weight.

The company claims big savings from this procedure. Cases of lost circulation have been sharply reduced, mud bills have been cheaper, drilling has been faster, intermediate casing is always below the low-pressure lost-circulation zones, and wall sticking has been no problem in this part of the hole. Because the company and its contractors are careful, none of the kicks has turned into anything worse.

Not many operators are prepared to go so far in reducing mud weights.

Nor would it be practical in many areas. Still, most have found they can safely cut mud weight under past practice. Anytime mud weight is reduced, there are some to say it is dangerous. It takes good analysis of the case at hand to decide where good practice ends and living dangerously begins.

The effect of excess mud weight gets worse as the well deepens. Pressure in the well bore is principally the hydrostatic head of the mud. The longer the mud column, the higher the pressure and, usually, the higher the pressure differential between well bore and formation.

Centralizers, stabilizers. When Gulf Coast drillers began 3 or 4 years ago to recognize wall sticking for what it is, their first concern was to keep collars from contacting the walls of the hole. Most obvious way to do this was to run centralizers or stabilizers in the string. These tools have proved quite effective. One contractor estimates that after he began using centralizers regularly, collars became stuck less than one-third as often as before.

Using stabilizers to prevent wall sticking is different from using them to prevent crooked hole. For crooked hole, stabilizers are needed only on the bottom several collars. To prevent wall sticking, they are just as much needed at the top of

the collar string as at the bottom. On a long string of collars the result is use of a large number of stabilizers. And, long strings of collars have become increasingly common on the Gulf Coast. This fact has made popular still another means of cutting down on contact between collars and hole walls.

Spiral-cut collars. In areas where collars frequently become stuck in the deep hole, more and more strings of "spiral-cut" collars are being run. These collars have a helical groove milled into the outside diameter running almost the entire length of the collar. Because they are recessed, the grooved areas don't contact the hole wall; contact between collar and wall is reduced by the amount of grooving. Because of this reduced contact, the spiral-grooved collars don't stick so often as regular collars and, once stuck, they are easier to free.

Grooves in the new collars are flat, not concave. This fact has several important results: cuttings don't tend to ball up in the grooves; bag-type blowout preventers will seal on the collars; and there are no stress-concentrating "notches." Weight and stiffness are not seriously affected by presence of the groove.

More than 500 wells have already been drilled with strings of these collars. Companies using them report good success.

A new string of spiral-grooved drill pipe is now going into service. This string is 3½-in. 15.50-lb. pipe; with the grooves it still retains the strength of the common 13.30-lb. pipe. A complete top-to-bottom string of the spiral pipe isn't necessary; it will be used only as a "stringer" below protective casing where wall sticking of the drill pipe is a danger.

Cake, fluid loss. There's still a lot of uncertainty among Gulf Coast engineers about the exact effect of two mud properties on wall sticking. These properties are filter-cake thickness and water loss. Many feel that a high water loss means more sticking.[3] It isn't clear just how water loss affects sticking but it doesn't appear there'll be much benefit in cutting water loss below about 4 or 5 cc. And, there's opposition to the extra-low water-loss muds because they slow drilling.

Many feel it's apparent a thick filter cake will result in more wall sticking than a thin cake. They reason that the thicker the cake, the more completely a collar can become embedded. And, the more embedding, the more area of collar is exposed to reduce formation pressure.

Jarring alone not enough. After the drill string has become wall stuck in a deep well, it isn't often that jarring alone will free it. Something else is needed to penetrate the filter cake and equalize the pressure behind the collars which hold them tightly to the hole wall. Until quite recently, this "something else" has been crude oil; when no crude was handy, diesel oil was used. These oils worked often enough to make them worth trying any time pipe was stuck in the past.

Now, Gulf Coast drillers believe they can free the pipe more often if they use a fluid with better wetting and penetrating properties than possessed by either the average field crude or by diesel oil. There are a number of commercial wetting agents available which help. At least one mud company has compounded a special chemical for freeing stuck pipe. First tests have been quite successful and the material should be on the market soon.

The oil company has even used e.p. lubricant to help free stuck pipe. When first put into the field, the e.p. material was primarily intended to lubricate bit bears and to reduce torque in the hole. However, many say they soon found that pipe doesn't become stuck as frequently when the material is carried in the mud. In any case, the e.p. lubricant does contain excellent wetting agents. The company which uses it to free stuck pipe mixes it with diesel oil and spots the mixture around the collars. The string has been freed in 9 of the first 11 attempts the company made.

Weighted, spotted. Many drilling men prefer not to use ordinary diesel-oil mixtures in holes which carry high-weight muds. Since diesel oil weighs only about 8 lb. per gallon, it tends to move up the hole when spotted on bottom with heavier mud above. As a result, the mixture may flow up the hole and be in contact with the stuck area too short a time to penetrate the wall cake thoroughly.

With this fact in mind, many prefer to use mixtures weighted up to the same density as the mud in the hole. These mixtures may be either oil-base mud or invert emulsions. Since these fluids are the same weight as the mud already in the hole, they remain in place after being spotted.

Gulf Coast mud companies keep ready-mixed batches of oil-base or invert-emulsion muds in some areas. This weighted mud is ready to dispatch by tank truck to rigs where pipe becomes stuck.

On several occasions, mud acid has been spotted to help free stuck collars. Acid certainly attacks the filter cake and should help in that respect. However, most feel that the acid usually attacks too much of the hole and the mud system as well. They say that they "get into as much trouble with acid as they get out of."

Best practice is to spot the special mixture completely through the open-hole section. There are several reasons for this. First, it's difficult and time-consuming to locate precisely where the string is stuck. Even when the stuck point is pinpointed, it is questionable whether a small batch of fluid can be circulated into the stuck area with sufficient accuracy. Furthermore, after the pipe has been stuck and remained motionless for some time, it likely becomes stuck at other points as well.

After the fluid has been spotted, usual practice is to back off the string as deep as possible. Then, jars and more collars are run and the fish engaged with an overshot. After the special fluid has been in place for 15 hours or more, jarring usually free the string.

Real caution is needed if the stuck string must be washed over. Most companies advocate keeping the wash pipe in constant motion lest it become stuck also.

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33. How to find original oil in place by material balance above the bubble point

BY E. T. GUERRERO

GIVEN: Production, rock, and fluid data for an undersaturated oil reservoir are as follows:

p_i = initial reservoir pressure = 2,400 psia.

N_p = cumulative oil production = 148,400 st.-tk. bbl.

P_{ws} = average reservoir pressure = 1,832 psia.

p_b = bubble-point pressure = 1,500 psia.

R_{sb} = solution gas-oil ratio for pressures at and above bubble-point pressure = 490 s.c.f./st.-tk. bbl.

S_w = interstitial water saturation = 20.0% of pore vol.

B_w = water formation-vol. factor = 1.0.

B_{oi} = initial oil-formation volume factor = 1.234.

B_o = oil-formation volume factor at p_{ws} = 1.241.

B_f = rock-formation vol. factor = 1.0.

Compressibility factors at average reservoir conditions above 1,832 psig. are:

for oil, $C_o = 8 \times 10^{-6}$ vol./vol./psi.

for water, $C_w = 3 \times 10^{-6}$ vol./vol./psi.

for rock formation, $C_f = 4 \times 10^{-6}$ vol./vol./psi.

No water has been produced and no water influx is believed to have taken place. Thus $W_p = O$ and $W_e = O$.

FIND: Original oil in place.

METHOD OF SOLUTION:

Equations:

$$N = \frac{N_p B_o + (W_p - W_e)}{B_{oi} C_e (p_i - p_{ws})} \quad (1)$$

$$C_e = C_o + \frac{S_w}{1 - S_w} C_w B_w + \frac{C_f B_f}{1 - S_w} \quad (2)$$

Where B_f, B_w, N_p, B_o, B_{oi}, p_i, S_w, and p_{ws} have been defined with the given data and

N= original oil in place, st.-tk. bbl.

C_e = composite compressibility, vol./vol./psi.

W_p = cumulative water production, bbl.

W_e = cumulative water influx, bbl.

SOLUTION:

$$C_e = \left[8 + \left(\frac{0.20}{1.00 - 0.20}\right)(3)(1.0) + \frac{(4)(1.0)}{1.00 - 0.20} \right] 10^{-6}$$

$$= \left[8 + \frac{0.60}{0.80} + \frac{4}{0.80} \right] 10^{-6}$$

$$= 13.75 \times 10^{-6}$$

$$N = \frac{(148{,}400)(1.241)}{(1.234)(13.75 \times 10^{-6})(2400 - 1832)}$$

$$= 19.1 \times 10^{6} \text{ st. tk. bbl.}$$

DISCUSSION. Application of the material-balance equation in the form used here assumes: (1) pressure equilibrium within the reservoir at any time, (2) applicability of laboratory PVT data, and (3) reliable production data. There is little doubt that with proper care and procedures assumptions (2) and (3) can be well satisfied. The same is not true of assumption (1).

For undersaturated conditions, the magnitude of the pressure at any point in a pool is sensitive to the amount of oil production. Furthermore, variations in porosity, water saturation, and sand volume would cause appreciable pressure variations between wells producing at the same production rate. Normal development practices might conceivably cause a part of the field to be producing at a pressure slightly below the bubble point and the rest of the field at undersaturated conditions.

Also, large pressure gradients near the well bores are caused by production. This may mean that well pressures are below the bubble point. Thus the definition of reservoir conditions in an apparently undersaturated pool can be difficult. The sensitivity of pressure to fluid withdrawals makes the assumption of pressure equilibrium hard to satisfy.

Equation 1 defines the undersaturated conditions and shows that if no water production and influx are taking place, oil recovery is a direct function of pressure drop and effective compressibility. The com-

pressibility is given by Equation 2 and includes oil, interstitial water, and rock compressibilities. A drop in pressure within a reservoir rock results in an expansion of oil, interstitial water, and solid rock material and a reduction of rock pore volume. Importance of including the water and rock compressibilities can be readily shown and has been a practice in the past. If 8.00×10^{-6} (compressibility of oil) had been used in the solution instead of 13.75×10^{-6} then an answer of 32.8×10^{6} st.-tk. bbl. would have been obtained. This, and Equation 2, show the necessity of including results of interstitial water and rock expansion for undersaturated reservoir conditions.

A reliable figure of the initial oil in place for this reservoir was calculated to be 23.5×10^{6} st.-tk. bbl. This was obtained from material-balance calculations performed using pressure data below the bubble point and from volumetric calculations. Thus the value of 19.1×10^{6} bbl. computed in the problem is low by 19%.

Use of the material balance to determine initial oil in place from data obtained at undersaturated conditions is recommended only if a pool is initially highly undersaturated (say 2,000 psi. above bubble point), or has high permeability, and was completely developed over a short interval of time.

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OIL-WELL PUMPING
PART 33

Checking for proper counterbalance

BY JOSEPH ZABA

MOST beam pumping units now in operation use the weight-type counterbalance with pneumatic-type counterbalance increasing in special applications. (See Part 8 of this series for counterbalance principles.) Weight counterbalances are divided into beam-weight and rotary-weight types.

While the rotary-type counterbalances are most generally employed, a knowledge of the basics of the two types is of interest to the user. Because loads are imposed differently by the reciprocating and the rotating weights, different types of loadings result in parts of the surface equipment.[1 2 3 4 5 6 7] Design of surface equipment takes these load characteristics into consideration. Therefore, it is important to use the type of counterbalance for which the unit was designed.

Beam-weight counterbalance. Reciprocating weights have been located in many different places over the years, Fig. 40. Most modern pumping units have the weights placed on the beam.

Beam counterbalance effect depends on two factors. First is the position of the center of gravity of the weights with respect to the leverage points. For instance, in positions A and B, Fig. 40, the counterbalance effect would be respectively higher or lower than the actual weight of the counterbalance. Second, the counterbalance effect depends on the operating speed. The direction of motion of the weights is reversed twice during each stroke with the resulting acceleration and deceleration of the masses. The rates of acceleration and deceleration are a function of the geometry of the unit. The effective counterbalance may be expressed by the formula:

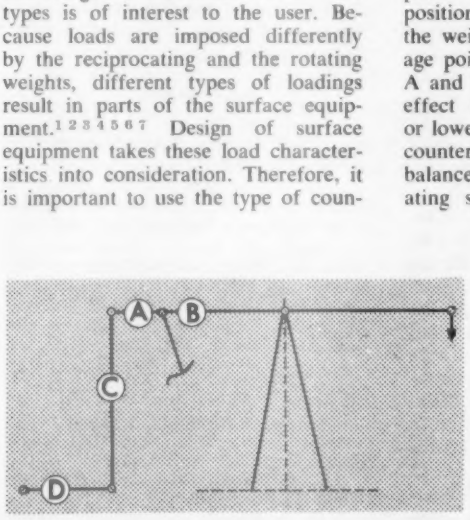
$$C_E = C \pm \frac{C}{g} a$$

Where:

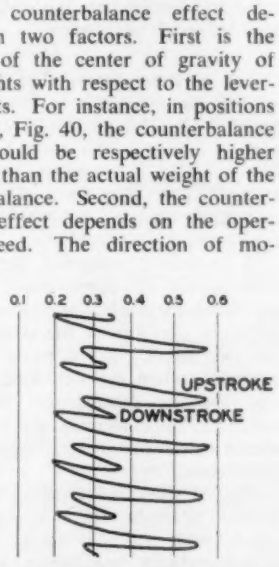
C_E = effective counterbalance, lb.
C = actual counterbalance, lb.
g = acceleration of gravity, 32 ft./sec.^{2}
a = vertical acceleration, ft./sec.^{2}

A properly constructed and installed beam counterbalance does not impose adverse stresses on the walking beam. Aligning the center of gravity of weights with the vertical centerline of the beam is important to avoid torsional stress. The pitman is in compression during one portion of the stroke and in tension during the other portion, so pitman bearings must be designed to carry both types of loadings. Reapplication of load to the gears at two crank positions where the torque equals zero, results in shock impact. This effect may be minimized by use of rotating inertia on the crankshaft.

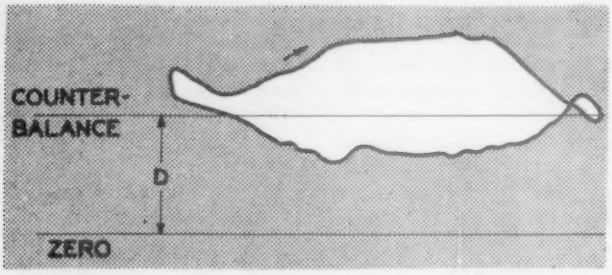
The characteristics of the beam



COUNTERBALANCE WEIGHTS may be found in several different locations on a beam pumping unit. Fig. 40.



RECORDING wattmeter chart can be used to find balance condition when the prime-mover is an electric motor. Fig. 41.



WHEN A WELL is in correct balance the line located a distance D from the zero line should divide the dynamometer card into approximately equal parts. See text. Fig. 42.

counterbalance reduce its application to small pumping units, with relatively short strokes and slow pumping speeds.

Rotary counterbalance. The relation between actual and effective counterbalance can be expressed by the formula:

$$C_E = \frac{C \times D}{R}$$

Where:

C_E = effective counterbalance, lb.
C = actual counterbalance, lb.
D = radius of rotation of center of gravity of weights.
R = radius of rotation of crank pin.

For constant-speed operation the effect of a rotary counterbalance is independent of the speed. The pitman is always in tension, and there is no reversal of loadings. Full load of well is imposed on the pitman and its bearings since the weights, exerting the force opposing the well load, are not interposed between the pitman and the well load. The centrifugal force exerted by the rotating weights is proportional to the square of the angular velocity of the crank. It may, therefore, become of considerable magnitude at high speeds and drops rapidly with decrease of speed. The force exerts a bending moment on the reducer shaft and creates continuously changing moments on the reducer itself. These forces are transferred to foundations which must be designed accordingly.

Checking the balance conditions. Because calculation of balance requirements gives results which, at best, are only an approximation, there is a need for actual check of balance conditions after a new installation has been put in operation. The need for such a check occurs also as well conditions change. Methods of checking can be divided into two groups: (1) direct methods, which check the performance of the surface equipment, either by observation or special handling of equipment, and (2) methods which involve use of special instruments.

Direct methods. Method of "slipping the clutch" involves gradual release of the clutch until it begins to slip.[8] In a properly counterbalanced well the clutch will slip equally on the upstroke and on the downstroke. If a well is out of balance the clutch will slip and slow down in one part of the stroke and catch and speed up in other part of the stroke. The engine throttle must be set at a fixed position during such a test.

If a well is powered with an internal-combustion engine, listening to the variations in exhaust will give an indication of balance conditions. These variations should be equal in both portions of the stroke. If a well is powered by an electric motor the intensity of the whine of the motor should be uniform throughout the cycle in a well-balanced installation.

Use of instruments. The tachometer will show changes in prime-mover speed during the pumping cycle. However, a flywheel will smooth out the loads during different points of the stroke. This flywheel effect may sometimes be high enough to lead to erroneous conclusions.

A recording wattmeter permits determination of instantaneous power input into the electric motor during different portions of the stroke. Reasonably equal current peaks for the upstroke, when the well load is lifted and for the downstroke, when the counterbalance weights are lifted, indicate conditions of satisfactory counterbalance.

Fig. 41 shows a wattmeter chart for a well operating at a speed of 22 s.p.m. with a 52-in. stroke. Undercounterbalance conditions are indicated since the current peaks for upstroke are much higher than those for the downstroke.

A dynamometer card offers means for determining upstroke and downstroke loads (Part 7). Therefore, a theoretically correct counterbalance can be determined from analysis of a dynamometer card.[9] Use of dynamometer cards for determining counterbalance requirements, which takes into consideration the geometry of the pumping unit, will be considered in the following installment.

The counterbalance effect may be found directly by use of a dynamometer. Procedure is as follows: Unit is stopped with pitman at right angles to the crank. If the unit is undercounterbalanced the rods will move downward when the brake is released. A clamp is placed on two bars on the stuffing box and the crank returned to the right-angle position. If the rods move upward, the unit is either in correct balance or it is overcounterbalanced. The clamp is placed below the beam hanger. A chain is placed around the clamp and down around the lead line. The clamp or the chain supports the difference between the weight of rods and the balance effect of the polished rod. To determine this effect it is only necessary to record this load on the card already taken by putting in motion the dynamometer card with styli in recording position. The record will be a horizontal line intersecting the card already taken, Fig. 42. The peak counterbalance effect will equal the distance D times the dynamometer constant. For correct balance conditions this line should divide the dynamometer card into approximately equal parts.

There may be considerable difference between the balance effect during the upstroke and downstroke as a result of the geometry of the unit. Data should be secured for both portions of the stroke. Direction of rotation should be noted.

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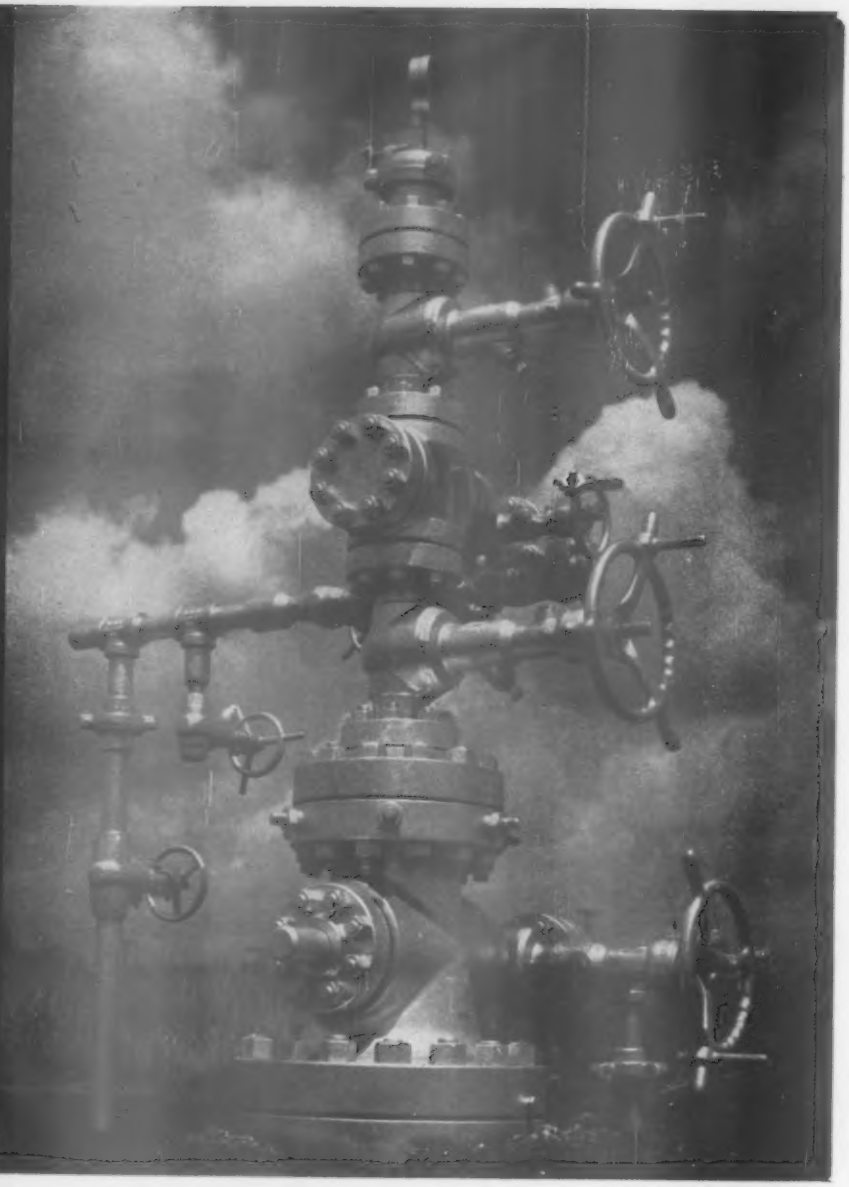

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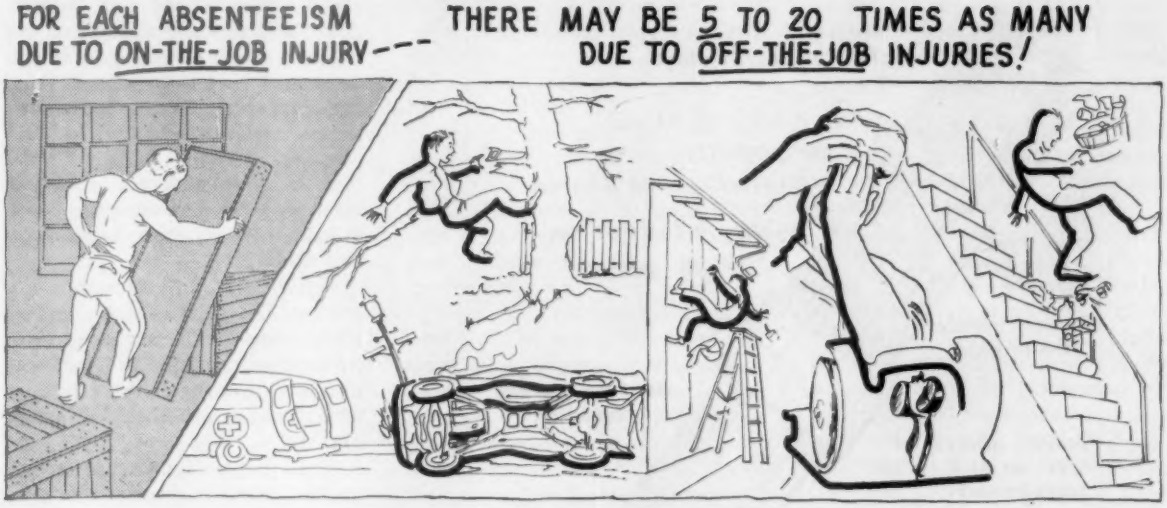


How to analyze a safety program

Here is an outline which will give a careful analysis of your accident and fire-prevention program.

BY JAMES H. HERBERT
Consultant, Accident and Fire Prevention
Greenwich, Conn.

ALL COMPANIES which are not already doing so should join their accident and fire-protection activities under one head. I don't see how the two responsibilities can be separated practically in petroleum operations. If a fire or explosion occurs and people are hurt, who has the staff responsibility—the fire-protection man or the safety man? There will be conflict, as I have observed in those operations where there is divided responsibility.

I believe that the engineering departments should have responsibility for such matters as establishing specifications for tank diking, venting, fixed fire-fighting equipment, and they should consider safety in the selection of each individual item of equipment, valve, tank, pressure vessel, fitting, and so on. However, even though each individual item may be specified and purchased in accordance with well-recognized codes, a study should be made of an entire project from the standpoint of over-all safety personnel representing line people who have to operate the equipment.

Parts 1, 2, and 3 of this series appeared February 6, 13, and 20.

In analyzing a safety program, the following questions should be raised to determine if sound safety practices exist, and to decide if they are being followed. I would like to point out that many of these practices are initiated in the early stages of safety programs but they often fall by the wayside. They must be closely followed and the degree to which they are adhered to is in direct proportion to the **degree of sincere interest in them by top management.**

1. Is there a company safety policy, and, if so, is it known by all employes, and is it referred to regularly by all levels of management, especially top management?

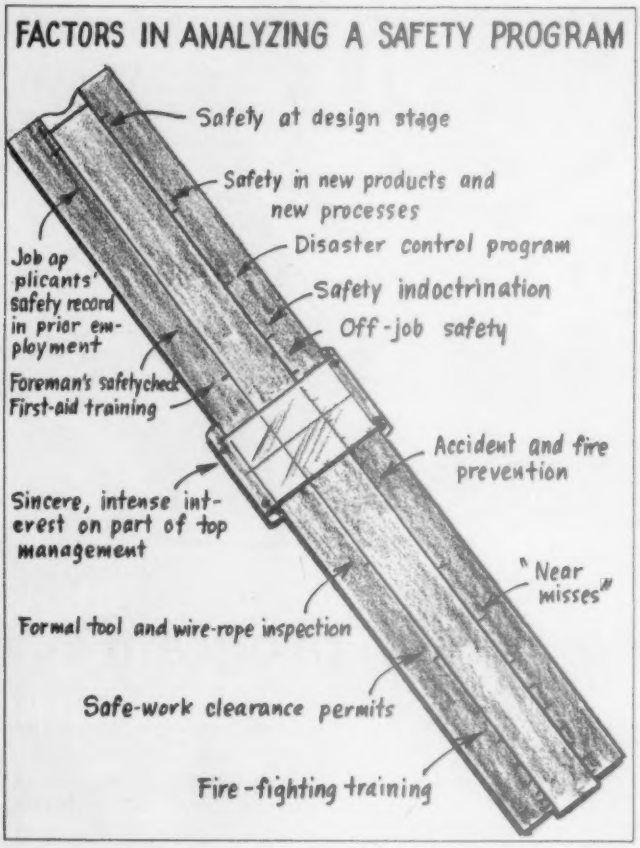
Most companies have safety policies. Considerable time and effort have gone into their development. They are invariably excellent and appropriate for the company in question. However, in some companies, they are highlighted for the first year or two and then fade into oblivion.

The difficulties arise when people fail to properly administer the existing policies. The opinion then arises that what is needed is a new policy, when all that is actually required is proper recognition and administration of the good policy already in effect.

It sometimes takes at least a year to develop properly a new policy, so unless a new one seems absolutely necessary it is suggested that the existing one be revitalized by top management with the real enthusiasm which that management always gives to the safety effort when it reflects upon its humanitarian and economic values.

2. In securing references for job applicants, is information obtained as to applicant's safe work performance in prior employment?

In the case of truck or car drivers, for instance, it would probably not be very good judgment to hire someone whose highway-accident record in prior employment or with his own car was bad. State motor-vehicle departments are cooperative in giving accident statistics, provided the applicant concurs. This does not mean that the applicant should not be employed in any capacity. He could be excellent in some other type of work, but the record, if bad, would indicate that it would be risky to employ him as a driver. The same principle applies to other endeavors.



If a person has a series of injuries in a certain type of work, either he has not been properly trained or he is not suited to that type of work.

3. Is there a formal safety indoctrination program for new employes?

When that question is asked, how many times the answer comes back, "There is one, but with all the changes going on right now, we don't have time to put our men through it," or "We'll get to it as soon as this construction program is completed." In the meantime, how many injuries and how many explosions are going to occur because someone didn't know? There is nothing more fundamental than a safety-indoctrination program. The dividends are high. Safety-indoctrination programs have to be pretty much homemade and should be kept up-to-date.

The word **formal** is important. There should be a definite outline for the program. It should not be hit or miss, and be left to the mood of the foreman or other teacher that day.

4. Is there a definite posted program for the use of personnel protective equipment, such as safety glasses, hats, shoes, and other clothing?

In some cases, employes learn of such programs only by word of mouth. They sometimes are anxious to use protective equipment, but are reluctant to ask for it because they think that their foreman or fellow employes will classify them as being sissies.

Baseball, football, and hockey-team managers and coaches are insistent upon their players wearing the best protective equipment which can be purchased. They do not want to lose their players as a result of an injury. Managers and supervisors do not want to lose their employes, either, as a result of an injury. But how many times we see managers and supervisors look the other way when they pass men who are not wearing proper equipment.

What is the employer's position with regard to paying for all or part of prescription safety glasses or for safety shoes? Suppose they are broken, then what? Some people are reluctant about asking questions. Posted copies of company policies clarify the questions, and, furthermore, help to sell the program.

Many people do not know whether an area is or is not one for hard hats or safety glasses. Conspicious signs will clarify the questions.

5. Is there a formal recorded, safety inspection for equipment such as hand tools, elevators, hoists, rope, and cables?

Again, the word formal is important. The same answer comes up many times to this question. "Yes, we have an inspection program. The man who uses the cable or tool, or whatever it is, looks at it before he uses it."

Good judgment, including the will to live, prompts airplane pilots to check their planes and instruments before they take off. But inspections by themselves did not prove to be sufficient. The formalities which are now required especially by the airlines are of great interest. There are checks and double checks. Nothing is left to a casual look. In some cases, three signatures are required to attest to a statement that a certain condition exists.

With the use of tool cribs, warehouses and storerooms throughout the oil industry, there is a wonderful opportunity to have formal checks on equipment. When tools and chain hoists, as examples, have been "tagged" by a person and the tag carries the initials of the person saying that the equipment is O.K. you can feel quite certain that it is O.K.

Uninspected unsafe rope and cables have been the causes of many injuries, but they have been the cause, too, of many incidents, known as "near-misses" which do not cause injuries but which do result in considerable property damage. This damage is rarely if ever recorded but contributes greatly to the economic waste factor. Rope and cable manufacturers are most cooperative in helping to develop safety checks for their products.

6. Is there an off-the-job safety program?

There are 5, 9, and even 22 times as many absenteeisms resulting from off-the-job injuries as compared with on-the-job injuries. These ratios are not infrequent. Of course,

the better the on-the-job record, the higher the ratio.

Many companies pay full wages for varying periods of time, mostly related to years of service, for absenteeism due to off-the-job injuries. This cost can run considerably higher than that for injuries on the job. Companies which keep accurate figures as to the frequency and severity of such occurrences quickly see what a financial burden this can be.

A safety program aimed at off-the-job injuries will pay extra dividends because an employe will be more likely to think of safety on an around-the-clock basis. This will make him more conscious of safety on the job. Such a program can also materially help to reduce injuries which occur to members of an employe's family.

It must not be forgotten that a considerable amount of such absenteeism occurs among supervisory, sales, and executive groups where wages are not only high but where it is difficult to make temporary replacements. Consequently, many activities suffer delays. Unknown sales opportunities are missed, and management direction is penalized. Members of boards of directors are not immune to off-the-job injuries, and, frequently, they show more interest in off-the-job safety material than any other group.

7. Do all supervisors point out, in detail, hazards of job assignments at the time employes are assigned to a job? And do they regularly talk with employes to see if they thoroughly understand the problems?

A sound accident and fire-protection program can help more than any other single factor in the development or maintenance of an efficient operation with high employe morale.

Keeping personnel at a high degree of enthusiasm and interest while working efficiently is the greatest problem of supervision. To meet this problem, there isn't any better aid to management than the development of safe practices, and then directing personnel to adhere closely to them.

All personnel can be asked by their supervisors, preferably on an individual basis, to suggest ideas which will bring about safe work practices. Work procedures can always be made safer. The analysis to make them safer invariably points out a more efficient way to perform the work.

Not too many people will work hard to develop ideas which will make their jobs more efficient, because of the risk of reduction in numbers of jobs. But they will enthusiastically do so to make their jobs safer, particularly if they are given proper leadership by their supervisors.

Work in petroleum companies, whether it be out in the producing fields, in a refinery, on a tanker or pipeline, or in a bulk plant or service station is not generally of the repetitive type found, for instance, on an assembly line. It is true that a man may repair the same pump over and over again, or the same type of pump, but the conditions are not always the same, either with the pump or the surrounding area.

This gives the supervisor many opportunities to discuss possible work hazards with his men. They have so much better chance to get to know each other than in ordinary assembly line work. Actually, safety is one of the few noncontroversial subjects left which can be discussed freely and enthusiastically.

Even though employes may strenuously object to penalties because of disorderly work, they accept the same penalty when they break safe practice rules, especially when some of their suggestions may have helped to bring about the rules. Consequently, they are more interested in obeying safety rules and in needling their fellow employes to do so.

Efficiencies from the types of relationships which can be established by these practices are of the highest caliber. They can be brought about by the safety approach better than through any other endeavor.

8. Is there a formal, prompt investigation by immediate supervision of all injuries, including minor injuries?

A prompt investigation by a supervisor as to the cause of one of his people being injured is the best way to determine whether or not the job was planned properly and, if so, was the employe following the plan. If he was not, did he understand the plan, or was he not well trained? In some cases, injury investigation is left to representatives of a safety department, generally for the express reason that the supervisor is too busy. What a wonderful opportunity is thereby missed by the supervisor.

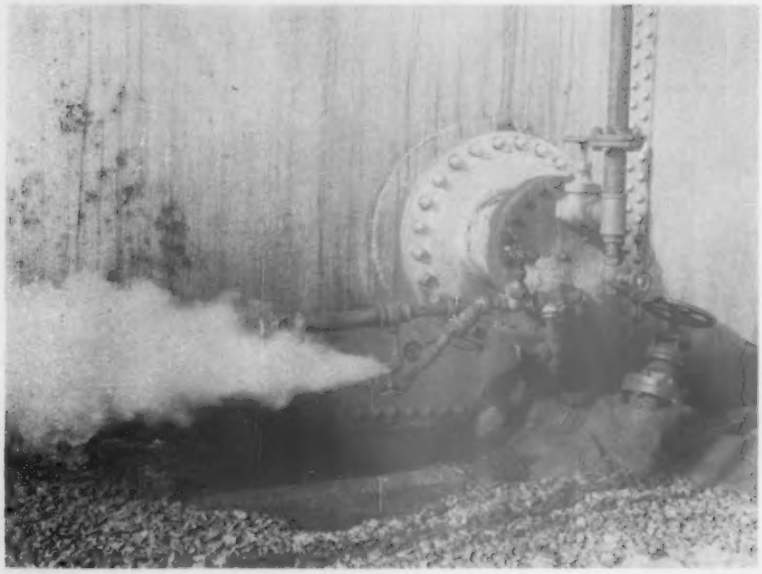
9. Is safety performance included in employe-performance reviews for all employes, including officers and department heads?

One of the best-known corporations in the United States places safety as the No. 1 item on its performance-review check lists. This is more significant for people in supervisory capacity. Supervisors who do not safely direct their personnel are not considered for further advancement until they do so. If their unsatisfactory record in this respect continues, they are relieved of their supervisory responsibilities.

A high rate of injuries or fires, minor as well as major, shows there is a problem in supervision, because, the conditions which produce a mediocre or bad accident or fire record reflect the same conditions which produce other management problems. It can also be used as an excellent medium for spotting impending trouble.

Central supervision, in dealing with intermediate and field supervision, can find its answers, in many cases, far more effectively and diplomatically through safety than through other mediums. A discussion of a plant's entire accident and fire-protection program, including discussions with first-line supervision, will quickly show the manner in which an operation's physical assets are cared for and will also show supervisory attitudes and general operation esprit de corps.

It is difficult for central or headquarters' management to discuss field operating problems with first-line supervision because of the feeling that top management may be trying to bypass local management. However, this feeling does not seem to exist in discussing accident and fire-protection matters. Field management does not seem to object to this approach. Actually, it seems to be enthusiastic about it because safety is a good medium through which to discuss many problems. The subject itself is noncontroversial. The problems lie only in the manner in which the objectives can be obtained.



EXPANSION TRAP doubles as steam trap and temperature regulator on these stock tanks. Product is maintained at about 190° F. with steam at 50 to 60 psig.

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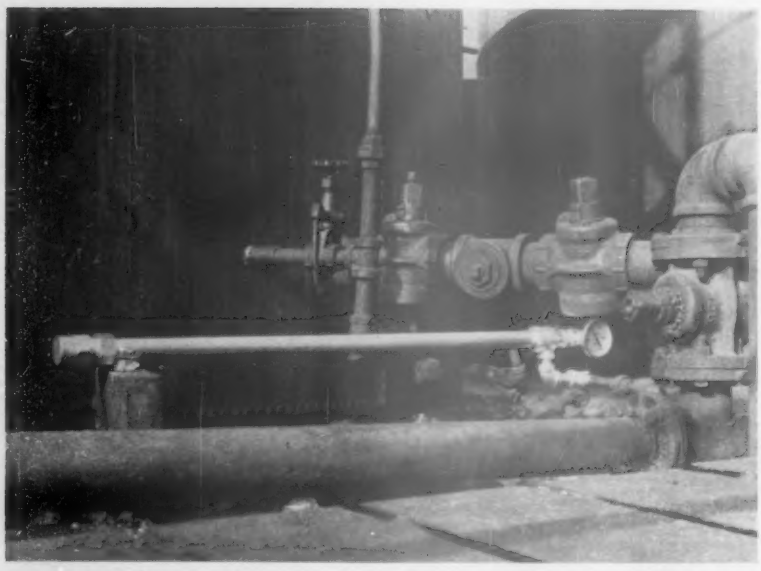
BY H. L. JOHNSON
Chief Engineer
W. H. Nicholson & Co.
Wilkes Barre, Pa.



DIRECT TEMPERATURE READINGS are available when dial indicating thermometer is attached to steam trap. This trap is controlling temperature at 190° F. on petroleum sulfonate tanks. Steam pressure is 80 to 120 psi.

AN EXPANSION steam trap can be used not only to remove condensate and air, but also to regulate temperature.

In many cases, loads and temperatures are reasonably uniform. It is here that an expansion trap can do a reliable job at low cost. It has been used for this dual steam trap-temperature regulation purpose on oil, wax, and asphalt storage tanks; steady-flow heat exchangers; still coils; and other constant-rate processes.

How it works. The expansion-type steam trap may be operated in one of two ways:

1. By the temperature difference between steam and condensate.
2. By the temperature of condensate alone, depending on initial adjustment or setting.

The valve is wide open if the trap is cold as shown in cutaway drawing.

When steam is in the trap, the bronze or stainless-steel expansion tube closes the valve.

Temperature at which the trap will close can be altered by adjusting the valve carrier. The farther it's screwed in, the lower the closing temperature of the trap will be.

And, because of its continuous-flow characteristics, the differential metal expansion trap is especially useful when condensate must be metered, or where quiet operation is required.

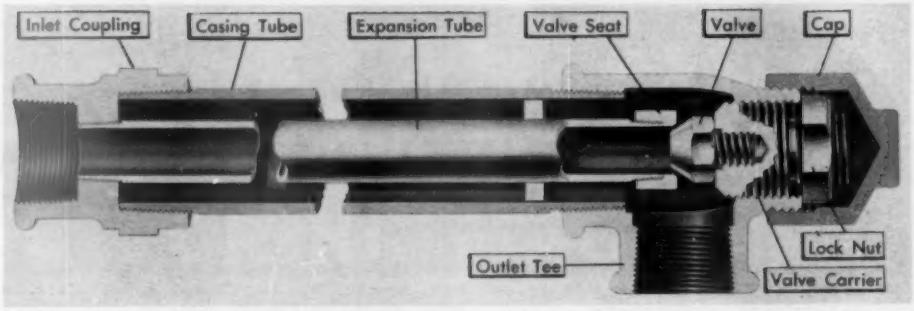
Where it's used. Over 50 differential metal expansion traps are installed on petroleum tanks at Sonneborn Chemical & Refining Corp.'s refinery in Petrolia, Pa.

Since these tanks must be maintained between 150° and 160° F., the temperature is difficult to control merely by regulating the steam-inlet valve on the 2-in. bottom heating coil.

The problem was solved by installing a ¾-in. pipe-size expansion steam trap on the discharge end of the heating coil. The trap was adjusted to operate within critical temperature limits of 150° and 160° F. And the job was done for a fraction of what it would cost with standard temperature regulators.

Once properly set, the expansion steam trap maintained tank temperature within limits regardless of weather conditions.

Sonneborn also uses expansion



TEMPERATURE at which valve will open can be adjusted with the valve carrier. Brass or stainless-steel expansion tube is used to move valve and allow condensate to escape.

traps on 132,000-gal. insulated tanks for holding petrolatum stock with a 134° F. melting point. Tank temperature is kept close to 160° F. by ¾-in. pipe-size traps which are 18 in. long.

Higher-melting-point stocks are kept in a 120,000-gal. tank. Temperature is maintained at about 185° F. by 1-in. pipe-size traps which are 40 in. long.

Another interesting use has been found where pipe-coil heaters are used to heat offices and shop. Where heaters were greatly oversized, workers were continually adjusting the steam-inlet valves to maintain comfortable temperature.

To solve this problem, expansion steam traps were installed to hold condensate back in the coils. This not only provided controlled temperature, but saved steam by making use of some of the sensible heat of the condensate.

Another unusual application involves a thermometer.

In Pennsylvania Refining Co.'s plant in Karns City, Pa., a special dial-indicating thermometer is attached to each trap to make it easier to see and to control. Here the ½-in. pipe-size expansion trap is used on 33,000-gal. petroleum sulfonate tanks which are held at 190° F.

The refinery must also maintain treating stocks within a narrow limit. Reason is that the material (70 to 500 S.s.U.) is hard to pump below 70° F. and temperatures above 80° F. harm the product. In this application, ½-in. pipe-size steam traps maintain temperature satisfactorily.

When to use. The use of steam traps for temperature regulation does have certain limitations.

An expansion trap must be adjusted, after installation, to maintain a stable temperature at a relatively uniform pressure and load. Therefore, if there is much variation in either steam pressure or process load, the trap will require repeated readjustments to perform adequately.

Insofar as degree of accuracy is concerned, the expansion trap should not be used for any closer control than plus or minus 3° to 5°. There are cases where expansion traps have been used to control processes within a 2° F. temperature range, but these are uncommon and are a bit too close for comfort.

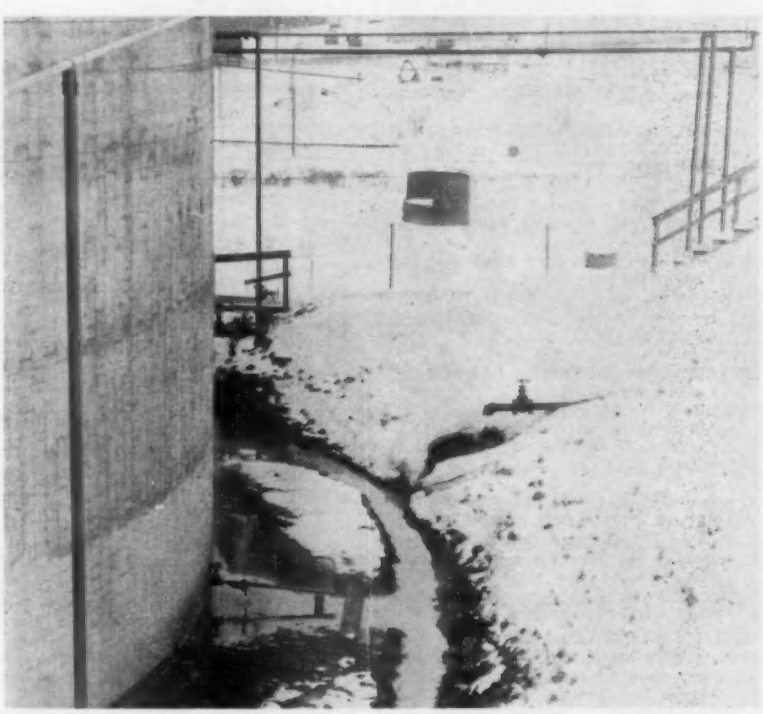
When process loads and temperatures are reasonably uniform, however, expansion traps perform efficiently and at low cost.

A temperature regulator will average from $100 to $150. An expansion steam trap will range in price from $30 to $60. And there is an additional savings which always results from controlled temperatures.

Expansion traps are suitable for any pressure up to 250 psi. without change of valve or seat.

For pressures from 0 to 150 psig. the expansion tube is made of brass. It is made of stainless steel for pressures from 150 to 250 psig.

Traps are available in pipe sizes of ¼ to 2 in. and in various lengths from 9 to 40 in.



PETROLATUM in this insulated stock tank is kept at about 160° F. with an expansion trap. Stock has a 134° F. melting point. Temperature can be maintained within 3° to 5° F.

Monthly Report on PIPELINE CONSTRUCTION

PIPELINE ACTIVITY reported here is compiled from surveys by The Oil and Gas Journal among pipeline companies and construction contractors.

This summary report appears in the last issue of The Journal each month. New construction projects are reported weekly in Pipeline Briefs in the Journal's news section.

Projects are listed in three groups—U. S., Canadian, and Foreign—and according to type of line—crude, products, natural gas, or miscellaneous.

★ The star symbol indicates the first appearance of the project in the Journal's survey.

U. S. Crude Oil Pipelines

CAPE PIPE LINE CO., (Sun Oil Co., Cities Service Co., Atlantic Refining Co.) Philadelphia.
Project: Line from lower Delaware Bay to Philadelphia.
Status: Proposed.

CONTINENTAL PIPE LINE CO., Drawer 1267, Ponca City, Okla.
Project: 4 miles of 3-in., 18 of 4-in., 123 of 6-in., 323 of 8-in., and 53 of 10-in., in new Glacier Pipe Line System from Cutbank, Mont., to Byron, Wyo.
Status: Under way.
Contractor: R. H. Fulton & Co., Lubbock, Tex.
Completion: August 31, 1961.

GILLETTE PIPELINE, INC., and A. W. HARTWIG, INC.
Project: A 102-mile line from Dead Horse Creek field to Casper, Wyo.
Status: Pending Wyoming Public Service Commission approval.

GREAT NORTHERN PIPE LINE CO., 175 East 4th St., St. Paul 1.
Project: 64-mile extension of system northwestward to the Lignite field, Burke County, North Dakota.
Status: Planned for 1961.

INTERNATIONAL OIL PIPELINE CORP., New York.
Project: Would own U. S. section of 1,500-mile, 30-in. line proposed by Mid-Continent Pipe Lines, Ltd., from Edmonton, Alta., to Chicago. (See Canada).
Status: Proposed.

MATADOR PIPE LINE CORP., Denver.
Project: 175-mile line from Burke, Bottineau, and Renville counties, North Dakota, to Cromer, Man.
Status: Pending approval of Canadian National Energy Board.

MESA PIPELINE CO., Midland, Tex.
★ Project: Extension of gathering system to other fields in West Texas and southeastern New Mexico.
Status: Planned.

MID-AMERICA PIPELINE CO., Skelly Building, Tulsa.
Project: 405-mile, 10-in. condensate line from Superior, Wis., to Chicago. It would connect at Superior with the trunk line of Lakehead Pipe Line Co., eastern division of Interprovincial Pipe Line Co. Shipments would be fed into Interprovincial from gathering lines now under consideration in Alberta.
Status: Proposed.

NORTHWESTERN REFINING CO., Box 248, St. Paul Park, Minn.
Project: 4, 6, and 8-in. gathering lines in Glenburn field, Renville and Bottineau counties, North Dakota.
Status: Has state approval.

PHILLIPS PIPE LINE CO., Bartlesville, Okla.
★ Project: 75-mile 6-in. main line and 85 miles of 4-in. gathering lines to handle crude and condensate, linking Camrick field, Oklahoma, to the Phillips, Tex., refinery.

ROCK ISLAND OIL & REFINING CO., INC., 321 West Douglas Ave., Koch Building, Wichita 2, Kans.
Project: 60 miles of 6 and 7-in. from fields in Red Willow County, Nebraska, to Arapahoe Pipe Line's Colby, Kans., station.
Status: Under way.
Contractors: Gilmore Construction Co. Hays, Kans.; Plains Construction Co., Kimball, Neb.; and Barney Bridges Ardmore, Okla.
Completion: Spring 1961.

TETON PIPE LINE CORP., 1700 Broadway, Denver 2.
Project: 45 miles of 6-in. gathering and transmission line in Dead Horse Creek, Barber Creek, and Sussex fields in Campbell and Johnson counties, Wyoming, to connect with Service Pipe Line Co. facilities at Sussex.
Status: Approved by Wyoming Public Service Commission.

U. S. Products Pipelines

BUCKEYE PIPE LINE CO., 30 Broad St., New York 4.
★ Project: 42-mile 8-in. extension of Midwest products system from Flint to Bay City, Mich.
Status: To start spring 1961.
Completion: By fall 1961.

CARL M. LOEB, RHOADES & CO., 42 Wall St., New York 5.
Project: 75-mile, 20-in. line from New Jersey refineries to Long Island and its two big airports, Idlewild and La Guardia.
Status: Study being made by Gulf Interstate Co., Houston.

DIXIE LPG PIPE LINE CO., (organized by Warren Petroleum Corp., Phillips Petroleum Co., Union Texas Natural Gas Co., and Tuloma Gas Products Co.), 800 Enterprise Building, Tulsa.
Project: 1,100-mile,, 8 to 10-in. propane line from the Houston area to Raleigh, N. C.
Status: Service Pipe Line Co., Tulsa, selected as design and construction agent. Construction may start first quarter 1961.
Completion: Fall 1961.

HUMBLE PIPE LINE CO., Box 2220, Houston.
Project: 11 miles of 4-in. LPG line from Baytown to Mont Belvieu, Tex.
Status: Planned.
Completion: June 1961.

NEW HAVEN PIPELINE, INC., 515 Madison Ave., New York 22, N. Y.
Project: 12-in. line from New Haven to Hartford, Conn., and 10-in. from there to Springfield, Mass., with a 6-in. spur to Westover Air Base at Ludlow, Mass.
Status: Proposed.

SOUTHERN PACIFIC PIPE LINES, INC., 65 Market St., San Francisco.
Project: 70-mile 8-in. jet-fuel line from Stockton to Castle Air Force Base near Atwater, Calif.
Contractor: Eastern Pipeline Contractors, Dallas.

TEXAS EASTERN TRANSMISSION CORP., Box 1189, Houston 1.
Project: 290-mile LPG line between South Louisiana and Mont Belvieu, Tex.
Status: Planned.

TRANS-SOUTHERN PIPELINE CORP. (subsidiary of Transcontinental Gas Pipe Line Corp., Box 296, Houston).
Project: 1,000 miles of 8 to 12-in. LPG line from Mont Belvieu, southeast of Houston, to Sanford, N. C., with spurs to Demopolis, Ala.; Hattiesburg, Miss.; and an area south of Baton Rouge.
Status: To start laying pipe March 1961.
Completion: By August 1961.

WEST SHORE PIPELINE CO. (Stock owned by Pure Oil Co. and Interstate Oil Pipe Line Co., a subsidiary of Standard Oil Co. of New Jersey).
Project: 200-mile line from Chicago to Milwaukee and Green Bay, Wis., with main line possibly 16-in. and laterals 12-in.
Status: Proposed. The line has backing of 10 oil companies.

U. S. Natural Gas Pipelines

ALABAMA-TENNESSEE NATURAL GAS CO., Box 380, Florence, Ala.
★ Project: 3½-mile, 6-in. line to serve Armour Agricultural Chemical in Colbert County, Alabama.
Status: Planned.

ALAMO GAS SUPPLY CO., Alamo National Building, San Antonio.
★ Project: 166 miles of 20, 22, and 24-in. line and 101 miles of 12, 16, and 24-in. line from Texas Gulf Coast to San Antonio.
Status: Projected.

ALASKA PIPE LINE CO., Houston, Tex.
Project: 74 miles from Kenai Unit gas field to Anchorage.
Status: Construction suspended until spring 1961.
Project: Extension of Kenai-Anchorage line to Fairbanks.
Status: Alaska Pipe Line Co. has ordered economic and engineering studies to determine feasibility of such a proposal.

ALGONQUIN GAS TRANSMISSION CO.,

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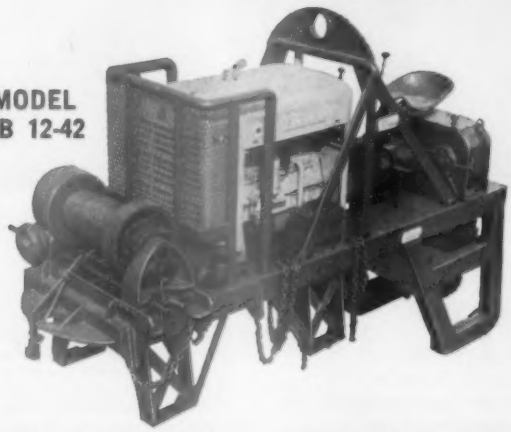
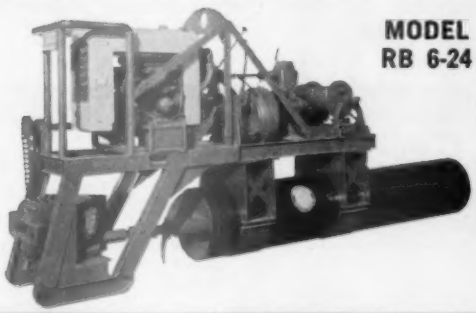
3 IMPROVED MODELS

MODEL RB 12-42



Designed to handle the big Jobs . . . will handle 42" casing and bore crossings up to 400 feet

MODEL RB 6-24



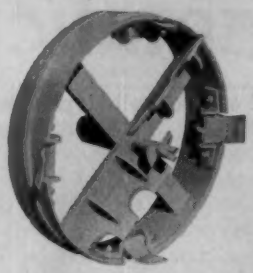
Designed to handle wide range of casing sizes — 8" to 24"

MODEL RB 4-12

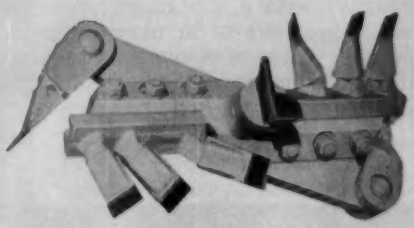
Narrow 20" width matches small size casing approaches

3 IMPROVED HEADS

CROSE ROCK HEAD



BIRDWELL HEAD



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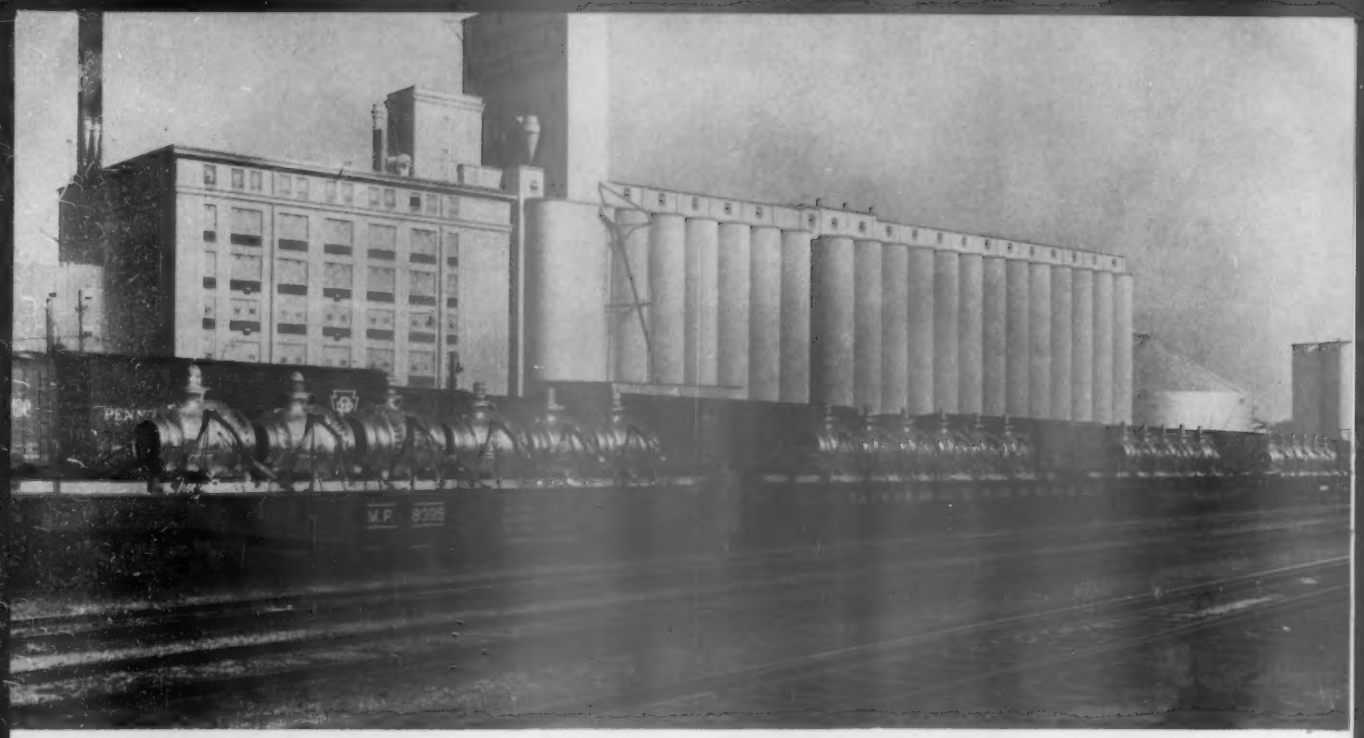

Flat carloads of Rockwell Hypresphere valves ready for shipment to a western gas transmission company.

ACCEPTANCE: BY THE TRAINLOAD

The trainload of Rockwell Hypresphere lubricated spherical plug valves (above) is dramatic evidence of the immediate acceptance of this valve by oil and gas pipeline engineers. Introduced just a little over a year ago (after three years of rugged field testing) the Hypresphere has been specified on most of the big, new pipeline jobs. Why?

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ROCKWELL-Nordstrom VALVES

another fine product by

ROCKWELL

Rockwell Hypresphere ready for underground installation. Note compact size for 30-inch valve.

PIPELINE CONSTRUCTION

25 Faneuil Hall Square, Boston 9, Mass.
Project: 30 miles of line in Massachusetts.
Status: Approved by FPC.

ARKANSAS WESTERN GAS CO., Box 405, Fayetteville, Ark.
Project: New lines from Altus, Coal Hill, and Rock Creek fields to the main system.
Status: Approved by Arkansas Public Service Commission.

BORDER GAS TRANSMISSION CORP. (owned by Lehman Brothers, New York investment firm, and Rio Gas Gathering Co., 615 National Bank of Commerce Building, San Antonio 5, Tex.).
Project: Gathering lines in Starr, Zapata, Jim Hogg, Brooks, and Webb counties, Texas.
Status: Proposed.
Project: Gathering lines in Dimmit, Zavala, and La Salle counties, Texas.
Status: Proposed.

CITIES SERVICE GAS CO., Box 1995, Oklahoma City 1.
★ Project: 10½ miles of 8-in. to connect Rounds and Porter plant with main line in Marion County, Kansas.
Status: Planned.
★ Project: Gathering lines in Sterling field, Comanche County, Oklahoma.
Status: Pending FPC approval.

COASTAL STATES GAS PRODUCING CO., 200 Petroleum Tower, Corpus Christi, Tex. (Subsidiaries include La Vaca Gathering Co. and South Texas Natural Gas Gathering Co.).
Project: 330 miles of various size pipe from Three Rivers area to southeast Lavaca County, Texas.
Completion: April 1, 1961.

COLORADO INTERSTATE GAS CO., Box 1087, Colorado Springs.
Project: 7 miles of 20-in. in Texas Panhandle.
Status: Pending FPC approval.
Completion: 1961.
Project: 109 miles of 26-in. from Texas Panhandle to southeastern Colorado, 134 miles of 34-in. from there to Pueblo, and 107 miles of 30-in. on to Denver.
Completion: 1961.
Project: 155 miles of 34-in. from Rock Springs, Wyo., to Provo, Utah, to connect with El Paso's proposed 395-mile line to California.
Status: Approved by FPC.
Completion: 1961.
Project: 32 miles of 6-in. from Central Colorado to Trinidad.
Status: Pending FPC approval.

COLORADO OIL & GAS CORP., Denver.
Project: 402-mile line from Gubik field to Fairbanks, Alaska.
Status: Proposed.

COLORADO-WYOMING GAS CO., Box 480, Denver 1.
★ Project: 16½-mile, 16-in. transmission line in Adams and Boulder counties, Colorado.
Status: Pending FPC approval.

COLUMBIA GAS SYSTEM, INC., 120 East 41 St., New York 17.
★ Projects: Eight loops averaging 8 miles each, plus 29 miles of 12-in. gathering line from near Houma, La., to the Texaco Dog Lake field.
Status: Planned.
Completion: 1961.

COLUMBIA GULF TRANSMISSION CO., Box 683, Houston 1.
Project: 97 miles of main-line loop in Kentucky, Tennessee, Mississippi, and Louisiana, and 29 miles of 12-in. lateral supply lines in Louisiana.
Status: Pending FPC approval.
Completion: 1961.

EL PASO GAS SUPPLY CO. (subsidiary of El Paso Natural Gas Co., Box 1492, El Paso).
Project: 227 miles from Live Oak County to a plant in Sutton County.
Status: Pending FPC approval.

EL PASO NATURAL GAS CO., Box 1492, El Paso, Tex.
Project: 52 miles of 20-in. transmission from new plant in Terrell County to a line connection in Pecos County, Texas, plus 23 miles of various-size field line.
Status: Approved by FPC.
Project: 119 miles of 30-in. Permian-San Juan crossover loop.
Status: Pending FPC approval.
Completion: 1961.
Project: 17 miles of 30-in. near Spokane, Wash.
Status: Pending FPC approval.
Completion: Not known.
Project: 34 miles of 20-in. from Puckett tie-in to Goldsmith, Tex.
Status: Pending FPC approval.
Completion: 1961.
Project: 23 miles of 20-in. from Goldsmith to the Eunice-Plains line, and 395 miles of 34-in. from Thistle, Utah, to near Las Vegas, Nev.
Completion: 1961.
Project: Loop on the San Juan mainline, involving 27½ miles of 34-in.
Status: Pending FPC approval.
Completion: Not known.
Project: About 228 miles of 30-in. from Coquat to Sonora, Tex.
Status: Pending FPC approval.
Completion: Not known.

EQUITABLE GAS CO., 420 Boulevard of the Allies, Pittsburgh, Pa.
Project: 15 miles of 16-in. in Monongalia County, West Virginia, and Greene County, Pennsylvania.
Status: Approved by FPC.

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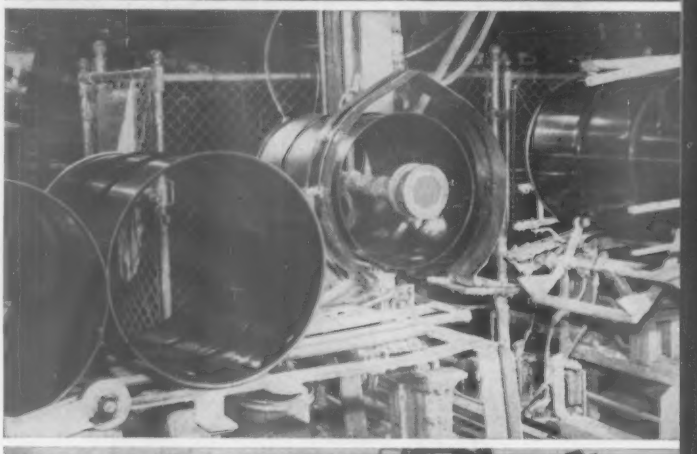

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PIPELINE CONSTRUCTION

Completion: October 1961.
Project: 6 miles of 20-in. in Greene County, Pennsylvania.
Status: Approved by FPC.
Completion: October 1961.
Project: 17 miles of 20-in. in Greene and Washington counties, Pennsylvania.
Status: Approved by FPC.
Completion: October 1962.

HOUSTON TEXAS GAS & OIL CORP., Box 10400, St. Petersburg 33, Fla.
Projects: 196 miles of 2 to 6-in. in various parts of Florida.
Status: Pending.

LONE STAR GAS CO., 301 South Harwood St., Dallas 1.
★ Project: 14½-mile, 8-in. connection of the company's system to Pure Oil's gasoline plant in Caddo field, Oklahoma.
Status: Planned.

LO-VACA GATHERING CO. (see parent company, Coastal States Gas Producing Co.)

MANUFACTURERS LIGHT & HEAT CO., Union Trust Building, Pittsburgh 19, Pa.
Project: 10½ miles of 24-in. Washington-ton and Beaver counties, Pennsylvania.
Status: Planned.
Completion: September 1961.

MISSISSIPPI RIVER FUEL CORP., 407 North 8th Street, St. Louis 1, Mo.
Project: 5 miles of 16-in. and 15 miles of 12-in. from Collinsville, Ill., to St. Jacob, Ill.
Status: Pending FPC approval.

MISSISSIPPI RIVER TRANSMISSION CORP. (Mississippi River Fuel Corp.), St. Louis.
Project: 94 miles of 18-in. from Johnsonville, Ill., to the St. Louis area.

MONTANA POWER CO., Box 1338, Butte, Mont.
Project: 16-in. line from Carway, Alta., to Cut Bank, Mont.
Status: Proposed.

NATURAL GAS PIPELINE CO. OF AMERICA, 122 South Michigan Avenue, Chicago.
Project: 50 miles of 20-in. laterals and 4.5 miles of 6-in. laterals to connect with existing 26-in. system in Jim Wells County, Texas, plus 33 miles of 10-in. laterals in the Normanna area.
Status: Temporary FPC approval.
Project: 347 miles of 8, 30, and 36-in. loop and gathering line at various locations between Texas and Illinois.
Status: Pending FPC approval.
Completion: 1961.

NORTHERN NATURAL GAS CO., 2223 Dodge St., Omaha 1, Neb.
★ Project: 1,200 miles of laterals to extend service to communities in Iowa, Minnesota, South Dakota, Nebraska, and Illinois.
Completion: 1961.

PACIFIC GAS & ELECTRIC CO., 245 Market St., San Francisco.
Project: 67 miles of line from Kettleman Hills to Morro Bay, Calif.
Project: 120 miles of 34-in. looping of Topock-Milpitas main line.
Status: Planned. Pending FPC approval.
Completion: 1961.
Project: 291 miles of 36-in. from the California-Oregon border to Antioch, Calif. (Part of a 1,400-mile project to move Alberta gas to San Francisco.)
Contractor: H. C. Price Co., Bartlesville, Okla. (Bechtel Corp. San Francisco, is the engineering manager.)
Status: Under way.
Completion: System will be in use during 1961-62 winter season.

PACIFIC GAS TRANSMISSION CO. (Pacific Gas & Electric Co., San Francisco).
Project: 611 miles of 36-in. from the Canadian border at Eastport, Idaho, to the California border near Klammath Falls, Ore. (Part of a 1,400-mile project to move Alberta gas to San Francisco.)
Contractors: Western Pipe Line, Inc., Austin, Tex., and J. P. Neill & Co., Dallas, have contracts for the 465-mile southern portion. H. C. Price Co., Bartlesville, Okla., has contract for the 146-mile northern portion from Rosalia, Wash., to Eastport, Idaho. (Bechtel Corp., San Francisco, is the engineering manager.)
Status: Under way.
Completion: The system will be in use during the 1961-62 winter season.

PAN AMERICAN GAS CO., Box 591, Tulsa.
Project: 50-mile system from Pan American's terminal at Texas City to Pasadena and La Porte.
Status: Under way.

PANHANDLE EASTERN PIPE LINE CO., 120 Broadway, New York.
Project: 298 miles of 30-in. loops, 43 miles of 16 to 26-in. supply laterals, and 80 miles of 6 to 12-in. sales laterals.
Status: Pending FPC approval.

PHILLIPS PETROLEUM CO., Bartlesville, Okla.
Project: 16 miles of 2 to 8-in. gathering line in Eddy County, New Mexico.
Status: Planned.
Project: 17 miles of 4 to 10-in. gathering line in Midland County, Texas.
Status: Planned.

PIONEER NATURAL GAS CO., Amarillo.
Project: 21 miles of 12-in. from Sudan to Muleshoe, Tex.
Status: Pending FPC approval.

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PIPELINE CONSTRUCTION

Project: 12 miles of 10-in. from Muleshoe, Tex. northward.
Status: Pending FPC approval.

PUBLIC SERVICE CO. OF NORTH CAROLINA, Gastonia, N. C.
Project: 17½ miles of 14-in. between Stem and Roxboro, N. C.
Status: Under way.

SOUTHERN CALIFORNIA GAS CO., and SOUTHERN COUNTIES GAS CO. OF CALIFORNIA, Los Angeles.
Project: 150-mile line across southern California from the Nevada border to the Los Angeles basin. Line would connect with a proposed El Paso Natural Gas Co. line extending to Rock Springs, Wyo.
Status: Pending approval of State Public Utilities Commission of California.

SOUTHERN UNION GAS CO., Fidelity Union Tower, Dallas 1. and **EL PASO NATURAL GAS CO.,** Box 1492, El Paso.
Project: 60-mile line from El Paso's main line near Holbrook, Ariz., to paper mill under construction near Snowflake.
Status: Planned.

ST. LAWRENCE GAS CO., Ogdensburg, N. Y.
Project: 75 miles of line from Cornwall, Ont., to Ogdensburg, N. Y.
Status: Approved by FPC.

TENNESSEE GAS PIPELINE CO., a division of Tennessee Gas Transmission Co., Box 2511, Houston 1, Tex.
Project: 15 miles of 12-in. gathering line offshore Louisiana.
Status: Pending FPC approval.
Project: 11½ miles of 20-in. offshore Louisiana.
Status: Pending FPC approval.
Project: 21 miles of 16-in. gathering line from Louisian coast to Block 46 in the Vermillion area.
Status: Pending FPC approval.
Project: 2 miles of 12-in. gathering line from Block 66 to Block 64, East Cameron area, offshore Louisiana.
Status: Pending FPC approval.
Project: 158 miles of 36-in. loop lines at various points between Kinder, La., and Centerville, Tenn.
Status: Approved by FPC.
Project: 50½ miles of 10 to 16-in. gathering lines offshore Louisiana.
Status: Approved by FPC.
Project: 12 miles of 12-in. gathering line from Louisiana coast to Block 17, East Cameron area, offshore Louisiana.
Status: Under way.
Contractors: Popich Marine Construction Co. and Brown & Root, Inc., Houston
Project: 166 miles of 36 and 30-in. loop lines at various points in Ohio and Pennsylvania.
Status: Pending FPC approval.

TENNESSEE GAS TRANSMISSION CO., Box 2511, Houston.
Project: For proposal to carry Texas gas to California via a 1,100-mile 30-in. line through Mexico, see Foreign Natural Gas listing.
Project: 292-mile line from the California-Mexican border to Los Angeles to tie in with above-mentioned line across northern Mexico.
Status: Tennessee Gas's subsidiary, California Gas Transmission Co., and Southern California Edison Co. have filed applications with California Public Utilities Commission. Also pending FPC approval.
Completion: July 1962.
Project: A line from producing fields in Texas to the Mexican-Texas border, which would connect with proposed line through northern Mexico to California.
Status: Tennessee Gas has formed a Texas subsidiary, Tennessee California Gas Transmission Co., to build and operate the Texas segment.

TEXAS EASTERN TRANSMISSION CORP., Box 1189, Houston 1.
★ Projects: 165 miles of 20-in. from West Monroe, La., to Kosciusko, Miss.; 128 miles of 30-in. loops from there to Lambertville, N. J.; and 37 miles of laterals in New Jersey.
Status: To be handled by next winter.
★ Project: 144 miles to be built in 1962.

TEXAS GAS TRANSMISSION CORP., Box 577, Owensboro, Ky.
Projects: 146 miles of new line including 6, 26, and 30-in. loops in Kentucky, Tennessee, Mississippi, Louisiana, and Indiana, and 50 miles of 8 and 16-in. to connect five fields in Terrebonne Parish, Louisiana.

TRANSCONTINENTAL GAS PIPE LINE CORP., 3100 Travis St., Houston, Tex.
★ Project: 15 miles of 36-in. main-line loop to bypass reservoir of Cowan's Ford hydroelectric project on North Carolina's Catawba River.
Project: 7 miles of 16-in. in New Jersey.
Status: Pending FPC approval.
Completion: 1961.
Project: 31 miles of 30-in. in Texas.
Status: Pending FPC approval.
Completion: 1961.
Projects: 36-in. as follows: 33 miles in Louisiana, 22 in Mississippi, 62 in Alabama, 39 in Georgia, 22 in South Caroline.
Status: Pending FPC approval.
Completion: 1961.

TRANSWESTERN PIPELINE CO., 618 First City National Bank Building, Houston 2, Tex.
Project: 240 miles of 4-in., 172 of 6-in. 134 of 8-in., 96 of 10-in., and 8 of 12-in. gathering line in Texas and Oklahoma. (Part of this listed in last month's report.)
Status: Under way.
Contractor: Sheehan Pipe Line Construction Co., Tulsa.
Completion: April 1961.

TRUNKLINE GAS CO., Box 1642, Houston.
Projects: About 155 miles of 30-in. loop in Illinois, Kentucky, Tennessee, Mississippi, and Louisiana, plus 17 miles of 24-in. loop from Lowry, La., to south of Iowa, La.
Contractors: Cape Construction Co., Girardeau, Mo., has 20 miles near Effingham, Ill., and Panama-Williams Corp., Houston, has 40 miles near Grove and Rayville, La.
Project: 52 miles of 20-in. from Bayou Sale to Cow Island, La.
Status: Pending FPC approval.

UNITED GAS PIPE LINE CO., Box 1407, Shreveport 92, La.
Project: 217 miles of 30-in. from St. Mary Parish to near Monroe, La.
Status: Pending FPC approval.
Completion: Late 1961.
Project: 59 miles of 36-in. purchase lateral connecting Bastian Bay field, Louisiana.
Status: Pending FPC approval.
Completion: Fall 1961.

WASHINGTON GAS LIGHT CO., 1100 H St., NW, Washington 5, D. C.
Project: 16 miles of 24-in. from near Alexandria, Va., to Prince Georges County, Maryland.
Status: Approved by FPC.

U. S. Miscellaneous Pipelines

LINDE CO., a division of Union Carbide Corp., 270 Park Ave., New York 17.
Project: 8-mile pipeline to deliver oxygen from new oxygen and nitrogen plant on the Houston Ship Channel to Arco Steel and Diamond Alkali.
Completion: 1961.

MONSANTO CHEMICAL CO., 800 North Lindbergh Blvd., St. Louis 66.
Project: 25-mile lines to move petrochemicals between proposed plant at Chocolate Bayou and Texas City.
Status: Planned.

SUNOLIN CHEMICAL CO., 1608 Walnut St., Philadelphia 3.
Project: Ten 8-in. chemical lines from SunOlin's ethylene-oxide plant under construction at Claymont, across the Delaware River to a point north of Penns Grove, N. J.
Status: Planned. To start this spring.
Completion: By late 1961.

TEXAS EASTERN TRANSMISSION CORP., Box 1189, Houston 1.
Project: 350 miles of 24-in. coal-slurry line to move West Virginia coal to electric companies in Pennsylvania, New York, and New Jersey. (Texas Eastern is working jointly with Consolidation Coal Co., Pittsburgh, Pa.)
Status: Proposed.
Completion: Possibly in 1962.

Canadian Crude Oil Pipelines

ACT OILS, LTD., 505 Eighth Avenue Building, Calgary.
Project: 450-mile line from Fort St. John area to Kitimat tidewater area of British Columbia.
Status: Proposed, but not for immediate future.

BITUMINOUS OIL PIPELINE CO. (Royalite Oil Co., Ltd., Royalite Building, Calgary.)
Project: A 250-mile line from Athabasca oil sands to Edmonton.
Status: Proposed.

HUDSON'S BAY OIL & GAS CO., LTD., 320 7th Ave. W, Calgary, Alta.
Project: 41 miles of 4 and 8-in. condensate line from the Waterton-Castle River area and Pincher Creek field in southwestern Alberta to Carway near the international border. The new line would then connect with Continental Pipe Line's Glacier crude system in Montana and Wyoming.
Status: Pending approval. (Hudson's plans new company, Aurora Pipe Line Co., to operate line.)

MATADOR PIPE LINE CORP., Denver.
Project: 175-mile line from Burke, Bottineau, and Renville counties, North Dakota, to Cromer, Man.
Status: Proposed. (See U. S.)

MID-CONTINENT PIPE LINES, LTD., Edmonton, Alta.
Project: 1,500 miles of 30-in. from Edmonton to Chicago. U. S. section to be owned by International Oil Pipeline Corp., New York City.
Status: Pending Canadian Board of Transport Commission approval. W. C. Gilman & Co., New York City, has made preliminary study.

RANGELAND PIPE LINE CO., Calgary.
Project: 111-mile line from Cessford field to Calgary.
Status: Pending approval of Alberta government.

TRANS-PRAIRIE PIPELINES, LTD., 12912 125 Ave., Edmonton, Alta.
Project: Expansion of gathering system in British Columbia will include 40 miles of 4-in. from Taylor to Dawson Creek; 30 miles of 6-in. from Boundary Lake to Taylor; 75 miles of 8-in. from Taylor to Milligan Creek, 11 miles of 4-in. from Milligan Creek to West Beaten;

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PIPELINE CONSTRUCTION

and 4 miles of 8-in. near the Taylor station.
Status: Under way.
Contractor: Banister Construction Co., Ltd., Edmonton.
Completion: By fall of 1961.

WESTCOAST TRANSMISSION CO., LTD., 700 Pacific Building, Calgary.
★ Project: 500-mile, 12-in. line to carry crude and liquids from Taylor, B. C., to Kamloops where it will connect with the Trans Mountain line to Vancouver.
Status: Approved by British Columbia government.

Canadian Products Pipelines

BRITAMOIL PIPE LINE CO., LTD., Box 130, Calgary, Alta.
Project: 126-mile 6-in. line from Pincher Creek to Calgary.
Status: Pending approval of the Alberta Oil and Gas Conservation Board.
Project: 64-mile 8-in. line from Dick Lake to Edmonton, Alta.
Status: Pending approval of the Alberta Oil and Gas Conservation Board.

FOOTHILLS PRODUCTS PIPE LINE LTD., (Pembina Pipe Line Co., Mannix Co., Ltd.), Calgary, Alta.
Project: 1,300 miles of 16-in. from Alberta to Chicago.
Status: Proposed. Standard Oil Co. (Ind.) will participate in the project.

HUGHENDEN PIPELINE.
Project: 125 miles from Dick Lake gasoline plant to underground storage in the Hughenden region of easter Alberta.
Status: Pending approval of Alberta Oil and Gas Conservation Board.

HYDROCARBONS PIPELINE, LTD., 239 Sixth Ave., SW, Calgary, Alta.
Project: 503-mile, 4 to 12-in. gathering system, with deliveries to Calgary, Innisfail, Hughenden, and Interprovincial Pipe Line Co.
Status: Pending approval of Alberta government.

PROVINCIAL PRODUCTS PIPELINES, LTD.
Project: 700 miles of 4 to 12-in. line to pick up propane, butane, and condensates from natural-gas plants in Alberta for delivery to refineries and other plants.
Status: Pending approval of Alberta Oil and Gas Conservation Board.

WESTALTA PRODUCTS PIPELINE, LTD., (Pembina Pipe Line, Ltd., Edmonton, Alta).
Project: 885-mile 4 to 16-in. gathering system to take natural-gas liquids from plants in Alberta for delivery to proposed Foothills trunkline to Great Lakes area.
Status: Pending approval of Alberta Board of Public Utility Commissioners. Standard Oil Co. (Ind.) will participate in the project.

Canadian Natural Gas Pipelines

ALBERTA GAS TRUNK LINE CO. LTD., Calgary.
Project: 226 miles of 36-in. and 125 miles of 30-in., plus laterals in southern Alberta including 58 miles of 22-in. and 64 miles of 16-in. (This is part of a 1,400-mile system to move Alberta gas to San Francisco.)
Contractors: Majestic Contractors, Ltd., Edmonton, has 113 miles of 36-in. from Crowsnest Pass to Priddis, 63 miles of 30-in. from Rocky Mountain House to Cynthia, and 38 miles of 22-in. lateral to the Rimbey region. Mannix Co., Ltd., Calgary, has 113 miles of 36-in. from Priddis to Rocky Mountain House. Dutton-Williams Brothers, Ltd., Calgary, has 62 miles of 30-in. from Cynthia to near Whitecourt, Alta., as well as a 20-mile, 22-in. lateral to the Whitecourt area. Piggott Construction, Ltd., Edmonton, has 64 miles of 16-in. lateral from Crowsnest Pass to Carway, Alta., on the U. S. border.
Completion: To be in use during the 1961-62 winter season.

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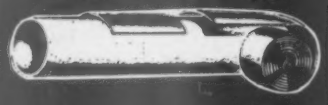

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PIPELINE CONSTRUCTION

Projects: The following laterals will be built in 1961 to tie in with the above mentioned 1,400-mile project from Alberta to San Francisco: 15 miles of 12-in. to Buck Lake, 23 miles of 22-in. to East Calgary, 15 miles of 16-in. to Carstairs, 4 miles of 8-in. to Sarcee, and 10 miles of 10-in. to Wildcat Hills. Other laterals to be built in the future will connect Kaybob, Berland River, Lovett River, and Stolberg.

ALBERTA NATURAL GAS CO., LTD. (Pacific Gas & Electric Co., San Francisco, and Westcoast Transmission, Calgary.)

Project: 108 miles of 36-in. from Crowsnest Pass across southeastern British Columbia to the U. S. border near Eastport, Idaho. (This is part of a 1,400-mile project to move gas from Alberta to San Francisco.)

Contractor: Price-Poole of Canada, Ltd. (Canadian Bechtel, Inc., Toronto, is engineering manager.)

Completion: The system will be in use during the 1961-62 winter season.

CANADIAN INDUSTRIAL GAS, LTD. (formerly Ajax Petroleums, Ltd.), Derrick Building, Calgary, Alta.

Project: 28 miles of 10-in. and 4 miles of 8-in. from Morinville to Westlock Viking Sand field.

Status: Planned.

Completion: By September 1961.

CARTIER GAS CORP. (St. Maurice Gas Inc., and Consumers Gas Co., 19 Toronto St., Toronto).

Project: Transmission and distribution in eastern townships and through to Quebec City in Quebec Province.

Status: Proposed.

GAS TRUNK LINE OF BRITISH COLUMBIA, LTD., Pacific Bldg., Calgary.

Project: 245-mile, 30-in. extension of Westcoast Transmission system from Taylor, B. C., to Fort Nelson.

Status: Planned. May possibly get under way early 1962.

MAGNA PIPELINE CO., LTD., Nanaimo, Vancouver Island, B. C.

Project: 53 miles of parallel 7-in. reinforced plastic pipe to serve Vancouver Island, B. C.

Status: Approved by British Columbia Public Utilities Commission. Tentative timetable calls for work to start by spring 1961.

NORTHERN ALBERTA PIPE LINES, LTD., Edmonton, Alta.

Project: 110-mile trunk line, plus gathering system, from Lac La Biche, in McMurray vicinity, to Edmonton.

Status: Pending provincial approval.

QUEBEC GAS TRANSMISSION LINES, INC., 1610 Sherbrooke St. W., Montreal.

Project: 300-mile line from Montreal to Quebec City.

Status: Seeking pipeline franchise from Quebec provincial government.

SARATOGA PROCESSING CO., LTD., 406 Petroleum Building. Calgary.

Project: 16-in. line from Savanna Creek field, Alberta, to a planned processing plant near Coleman.

Status: Pending approval.

VAN TOR OIL & EXPLORATION CO., Vancouver, B. C.

Project: Line from British Columbia mainland to Vancouver Island.

WESTCOAST TRANSMISSION CO. LTD., Calgary.

Project: 688-mile, 30-in. loop of British Columbia-Washington line.

Status: Proposed.

Project: (See Alberta Natural Gas Co., Ltd., for joint project).

Foreign Crude Oil Pipelines

ABU DHABIE MARINE AREAS, LTD. (partly owned by British Petroleum Co., Britannic House, Finsbury Circus, London E.C. 2).

Project: 20 miles of 18-in. from offshore Persian Gulf pool to Das Island.

Completion: 1962.

ALGERIAN LINE.

Project: 330-mile line from Ohanet field to Hassi Messaoud field where it would connect with existing line to Bougie seaport in Algeria. Eventually, the system would extend southeasterly from Ohanet field to Edjele field, which is presently served with a line to the La Skhirra seaport in Tunisia.

Contractors: First 140 miles of the Ohanet-Hassi Messaoud line will be laid by SOCOMAN, with completion by June 1961. Remainder of the Messaoud-Ohanet line will be built by GREP.

ALGERIAN LINES.

Project: 75-mile 10-in. line to link the new oil field, El Gassi-El Agreb, with the existing Hassi Messaoud-Bougie line. SNPA is field operator.

Status: Planned.

Project: 340-mile line from Ohanet field to the Hassi Messaoud system.

Status: Approved by French Council of Ministers.

BARNABO GROUP (Italian interests).

Project: A line from Venice, Italy, to Innsbruck, Austria, which could then be extended to Munich, Germany.

COUNCIL FOR MUTUAL ECONOMIC AID (Comecon).

Project: 2,800-mile system from the

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PIPELINE CONSTRUCTION

Volga-Ural oil fields in Russia to East Europe satellite countries.
Status: Construction under way in Poland, Hungary, and Czechoslovakia. Construction in Russia to start soon.

ENI (Italian state oil agency) and ITALO-SWISS FINANCE CO.
Project: A 700-mile system from Genoa to Aigle, Switzerland, thence northeast to the German border, where it would split with one branch going to Munich and another branch to the Karlsruhe area. Feeder lines would go to Turin, Milan, and Cremona, Italy.
Status: The trunk line from Genoa to Aigle approved by the Italian Government.

ENI (Italian state oil agency).
Project: Line from Trieste to Ingolstadt, Bavaria, with possible branch from Carnic in western Austria, to Vienna.
Status: Being discussed.

ESSO STANDARD (LIBYA), INC.
Project: 100 miles of 30-in. from Zelten field to Gulf of Sirte.
Status: Under way.
Contractor: Arabian Bechtel Corp.
Completion: Mid-1961.

GERMAN LINE planned by eight German refining and marketing companies (British Petroleum, Esso, Deutsche Erdoel, Shell, Gelsenberg-Benzin, Mobil, Schloven-Chemie, and Wintershall).
Project: 155-mile, 24-in. line to Bavaria from Karlsruhe.
Status: Planned.

IRANIAN OIL EXPLORATION & PRODUCING CO.
Project: 30 miles of 20-in. and 22 miles of 16-in. looping of Agha Jari to Bander Mashur line.
Status: Planned.

IRAQ PETROLEUM CO., LTD., 214 Oxford St., London W 1.
Project: Looping of Kirkuk-Mediterranean system is under way on a 66-mile stretch between K-1 and K-2 stations and on an 81-mile stretch between K-3 towards the Syrian border. In Syria, a 28-mile section of 30-in. is under way

MENE GRANDE OIL CO., Apartado 709, Caracas.
Project: 16-in. line at Block 11, Maracaibo.
Completion: December 1961.

OASIS OIL CO. OF LIBYA, 539 South Main St., Findlay, Ohio. (Other participants are Esso Sirte and Libyan American Oil Co.)
Project: 86 miles of 30-in. from the Dahra area of Libya to El Sider on the Mediterranean Coast, and 36 miles of 20-in. feeder line from the Mabruk area to the 30-in. line.
Status: Planned.

OIL INDIA, LTD. (Burmah Oil Co. and Assam Oil Co., two-thirds, and India Government, one-third).
Project: 720 miles of line in northeast India. This will include 250 miles of 16-in. from Nahorkatiya to Noonmati and 470 miles of 14-in. from Noonmati to Barauni.
Contractors: Mannesmann, a German firm, and SAIPEM, a member of the ENI group.
Status: Under way.
Completion: The 16-in. system is scheduled for completion late 1961.

PETROLEO BRASILEIRO S.A. (Brazil).
Project: 250-mile line from Rio de Janeiro to Belo Horizonte refinery site.
Status: Under consideration.,
Project: 35 miles of 8 to 12-in. pipe from Buracica to Candeia.
Contractor: Techint, Inc., Milan, Italy.
Project: 80 miles of 24-in. to tie in to proposed Caxias refinery near Rio de Janeiro.
Status: Planned.

PHILLIPS PETROLEUM CO., Bartlesville, Okla.
Project: 14-in. line in Block 17, Lake Maracaibo, Venezuela.
Status: Planned.
Contractor: Chicago Bridge & Iron Co.

ROYAL DUTCH-SHELL.
Project: 12-mile line from Gore Bay, Australia, to Royal Dutch-Shell's Clyde refinery.
Status: Planned.
Project: 161 miles 20-in. line from Tandzung field to Balikpapan refinery, Borneo.
Status: Planned.
Contractor: Williams Brothers Overseas, Ltd., Tulsa, and John Brown, Ltd., London.
Completion: January 1, 1962.

SOUTH EUROPEAN PIPELINE CO. (Jersey Standard, Caltex, Shell, British Petroleum, and 12 other firms.)
Project: 419 mile 30-in. line from Lavera, near Marseille, to Strasbourg, with 40-mile extension to Karlsruhe, Germany. This may be extended into lower Batavia with a 155-mile, 22-in. segment.
Status: Under way.
Completion: 1963.

SYRIAN LINE.
Project: About 320 miles of 6-in. from interior of Syria to link Homs refinery with various fields.
Status: Under way.
Contractor: The Italian firm, Techint.
Completion: In 1962.

UNION OF SOVIET SOCIALIST REPUBLICS.
Project: 2,315 miles of 28-in. Trans-Siberian crude-products line from Ufa and Tuimazy fields in Bashkiria to Irkutsk.
Status: Under way.
(See Council for Mutual Economic Aid for information on new East Europe line.)

YACIMIENTOS PETROLIFEROS FISCALES (Argentina), Buenos Aires.
Project: 390 miles of 14-in. from fields in Neuquen Province, Argentina, to Bahia Blanca.
Status: Under way.
Project: 625 miles of 12-in. from Mendoza to San Lorenzo.
Status: Planned.

Foreign Products Pipelines

ARABIAN AMERICAN OIL CO., Dhahran, Saudi Arabia, and 505 Park Avenue, New York.
Project: 37 miles of 8-in. LPG line from Abqaik to 'Ain Dar.
Contractor: Aramco-Bechtel.
Completion: 1961.

INDIA GOVERNMENT.
Projects: 600-mile line across northern India from Barauni to Delhi via Kanpur. Lucknow, and Allahabad; 300-mile combination crude and products line from Bombay to Bhusaval; 120-mile products line from Bombay to Poona to be extended 300 miles, later, to Hyderabad; and a 350-mile products line from Cochin to Madras via Bangalore.
Status: Proposed. Recommendation has been made to start work on three of the systems immediately, with completion in 5 years. The fourth system would be started in 1963. Which might be built first was not disclosed.

NATIONAL IRANIAN OIL CO., Teheran.
Project: 520 miles of 8-in. from Rey to Meshed, Iran.
Status: Under way.
Contractor: Williams Brothers, Tulsa.

NORTH ATLANTIC TREATY ORGANIZATION (Bid details from Bureau of Foreign Commerce, U. S. Department of Commerce, Washington.)
Project: 57 miles of 8-in. in Germany to Land Baden-Wuerttemberg air field.
Project: 93 miles of 6-in. in Turkey.

PETROLEOS MEXICANOS, Avenida Juarez 92-94, Mexico City.
Project: 500-mile line from Minatitlan to Mexico City.
Status: Planned, with construction starting in 1961.
Completion: 12 to 18 months after construction starts.
Project: 270 miles of 8-in. from Torreon to Chihuahua.
Status: Under way.
Completion: September 1961.

PIPELINES OF PUERTO RICO, San Juan.
Project: 95 miles 8-in. from Penuelas to Catano.
Status: Approved by Puerto Rican Public Service Commission.

SYRIAN PIPELINE.
Project: About 310 miles from Homs to tank farms in the Damascus, Aleppo, and Latakia areas.

UNION OF SOVIET SOCIALIST REPUBLICS.
Project: 2,315 miles of 29-in. Trans-Siberian crude-products line from Ufa and Tuimazy fields in Bashkiria to Irkutsk.
Status: Under way.
Project: 700 miles from Novo-Kuibyshev refinery to Bryansk.
Status: Under way.

YACIMIENTOS PETROLIFEROS FISCALES (Argentina), Buenos Aires.
Project: 652 miles of 10-in. from Lujan de Cuyo to Buenos Aires.
Status: Planned.

Foreign Natural Gas Pipelines

BASRAH PETROLEUM CO., LTD., 214 Oxford St., Oxford Circus, London W. 1, England.
Projects: 65 miles of 12 to 16-in. line from Zubair to Fao, Iraq.
Contractor: Mothercat Co., Ltd., Beirut, Lebanon.
Completion: April 1961 for line to Fao.

GASES NATURALES DE COLOMBIA, S.A. (Owned 50% by Colombian Petroleum Co., which is affiliated with Mobil International and Texaco, and 50% by local interest.)
Project: 140 miles of 10-in. from Cicuco field to the Caribbean port of Barranquilla.
Completion: Late 1961.

INDIA.
Project: India plans to start formal talks with Pakistan soon concerning possibility of importing natural gas from Sui field into India.
Status: Preliminary studies indicate a pipeline to Bombay might be commercially sound.

INTERNATIONAL GAS CO. (recently formed by group of Beverly Hills and Tulsa businessmen), 1205 South Denver, Tulsa.
★ Project: New line to move Mexican gas through northern Mexico to the California border.
Status: Negotiating for Mexican gas supplies and Los Angeles customers.

ISRAEL GOVERNMENT and private interests.
Project: 17-mile, 6-in. line from Zohar field to the Dead Sea.
Contractor: Messrs. Sol el Boneh, Ltd., Haifa.
Completion: February 1961.
Project: 75 miles of 16-in. to power a plant at Ashdod Yam on the Mediterranean Coast.

PIPELINE CONSTRUCTION

Status: Planned.

NIOGAS.
Project: 82 miles of 8 and 10-in. to connect Traismauer and Amstetten in Austria.
Contractor: Williams Brothers, Tulsa.

PAKISTAN INDUSTRIAL DEVELOPMENT CORP.
Project: 1,000-mile system to carry gas from Sui field northward from Multan to Lyallpur, Lahore, Daudkhel, Islamabad, Rawalpindi, and Wah. This would require a loop to an existing 310-mile 16-in. line from the Pakistan petroleum field to Multan.
Status: Under consideration. Technical survey has been ordered.

PAKISTAN PETROLEUM CO.
Project: 145 miles of 8-in. from Sylhet field to Daccq, East Pakistan.
Status: Proposed.

PETROLEOS MEXICANOS, Avenida Juarez 92-94, Mexico City.
★ Project: A 500-mile northward extension of the newly completed gas line from Ciudad Pemex to Mexico City. It would extend to Queretaro, Salamanca, San Luis Potosi, and Guadalajara.
Status: Planned.
Project: 270 miles of 12-in. from Torreon to Chihuahua.
Status: Under way.
Completion: September 1961.
Project: For proposed Texas to California line through Mexico, see Tennessee Gas listing below.

SOC. SICILIANI METANDOTTI (SOSIM).
Partners include Edison Power, Italcementi, Fiat Motor, Sicilian SGES Power, Bombrini Parodi Delfino Chemical, and Montecatini.
Project: 560 miles from Hassi R'Mel gas field, Algeria, to Cape Bon, Tunisia, 77 miles across the Sicilian Channel, into northern Italy and beyond.
Status: Engineering studies under way.

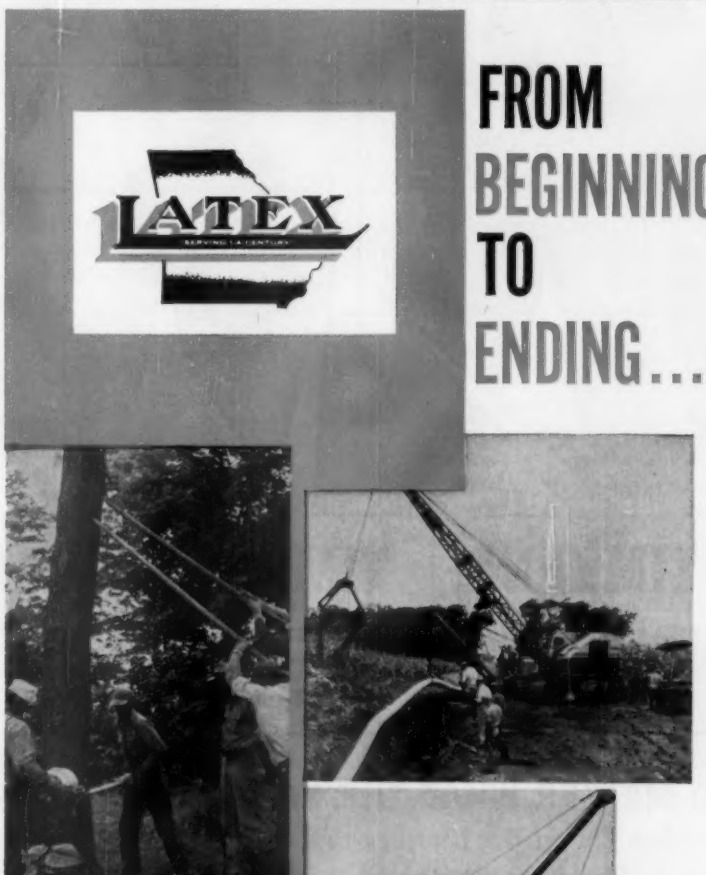
SOTHRA.
Project: A 315-mile system from Hassi R'Mel gas field in Algeria to the Mediterranean Coast, including 262 miles of 24-in. trunk from Hassi R'Mel to Relizane and 20-in. from Relizane to Arzew, plus branches to Oran and Algiers.
Status: Under way.
Contractors: Groupement Entrepose-Ste. Parisienne pour l'Industrie Electrique (GREP) has contract for 200 miles from Hassi R'Mel to Tiaret. Socoman has contract for 115 miles from Tiaret to Arzew.
Completion: Spring 1961.

STANDARD-VACUUM OIL CO., New York.
Project: 60 miles of 8-in. from Radja field to Palembang, Sumatra, to supply fertilizer plant planned by the government.
Status: Planned.

TEIKOKU OIL CO. and **TOKYO GAS CO.**
Project: These two companies are negotiating a proposed 200-mile, 12-in. system to move gas from Kubiki gas field in Japan.
Status: Proposed.

TENNESSEE GAS TRANSMISSION CO., Box 2511, Houston.
Project 1,100-mile, 30-in. line from Reynosa, near the southern tip of Texas, across Mexico to San Luis Rio Colorado, near the California border.
Status: Agreement signed by Petroleos Mexicanos and Tennessee Gas Transmission. Pemex would own the Mexican portion of the system. Pending FPC approval.

UNION OF SOVIET SOCIALIST REPUBLICS.
Project: New line from gas fields in western Ukraine to the Polish border.
Status: USSR has signed agreement with Poland.
Project: 250-mile line from Ust-Vilyuisk field to the Siberian cities of Yakutsk and Pokrovsk, plus feeder lines to supply villages in the Lena River Valley.
Status: Planned.
Completion: Date not set yet.
Project: Two parallel, 40-in. lines, each over 1,300 miles long, from Gazli, near Bukhara, northward to Sverdlovsk and Chelyabinsk.
Status: Planned.
Project: From Tashkent to Chimkent, Dzhambul, Frunze and Alma-Ata near Chinese border.
Completion: By 1965.
Project: Line from Berezovo field southward to Sverdlovsk.
Status: Proposed.
Project: Line from Minsk northward to Baltic Sea area.
Completion: To Vilnius, Lithuania, in 1961; to Riga, Latvia, in 1962.
Project: Line from Minsk northeast to Leningrad.
Status: Proposed.
Project: 800-mile, 40-in. line from Krasnodar fields north of Caucasus Mountains to Serpukhov, south of Moscow, via Rostov and Lugansk.
Status: Under way.
Project: 310 miles of 32-in. line ringing Moscow at radius of about 50 miles.
Status: Under way.
Completion: 1962.



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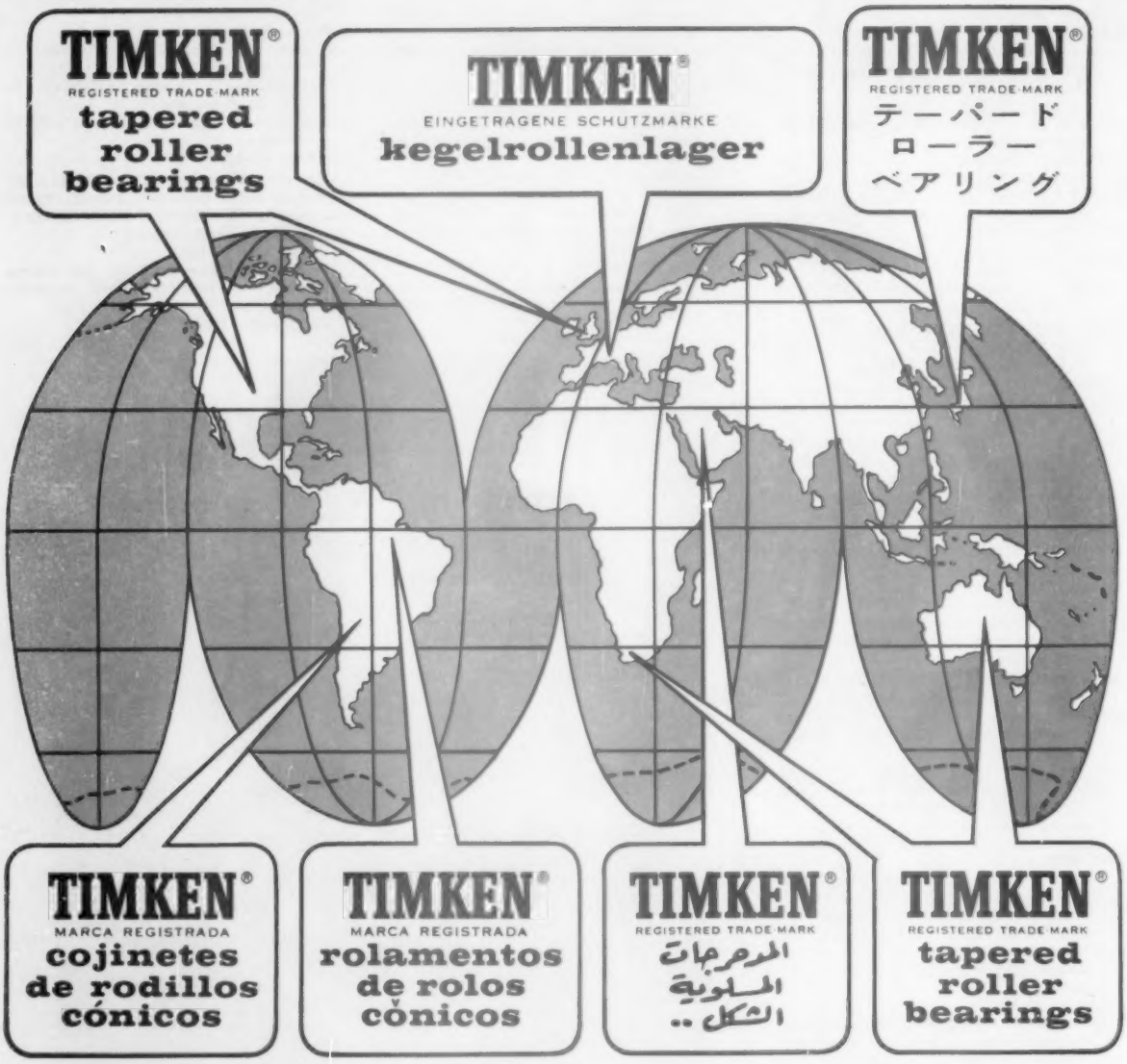

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And when you buy Timken bearings, you're assured of the engineering service of the world's most experienced and largest manufacturer of tapered roller bearings. The name "Timken" is a trade-mark identifying the bearings, steel and rock bits made by The Timken Roller Bearing Company and its subsidiaries and divisions the world over. The Timken Roller Bearing Company, Canton 6, Ohio, U.S.A. Cable address: "TIMROSCO". Timken bearings manufactured in U.S.A., Australia, Brazil, Canada, England and France.

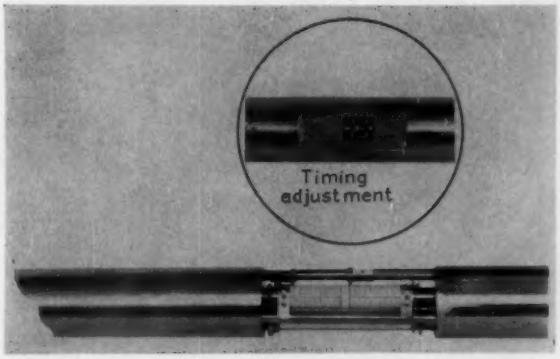
▶▶▶ New Equipment Section

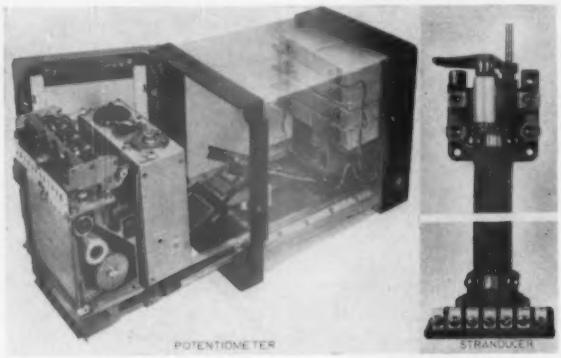
This week's SHOWCASE features . . .

Well-logging unit

. . . recently developed is a completely self-contained electric type that, the maker says, requires no additional equipment and can be used with standard type of probes. It is lowered into the hole on a wire line where it can record the separate traces.

Measuring 2¾ in. in diameter and 98 in. long, the tool can replace truck-mounted equipment ordinarily required for the logging process, the maker claims. Completely transistorized, the logging unit carries its own batteries and is independent of outside power sources. It is said to be capable of operating to a depth of 15,000 ft. and to withstand temperatures above 300° F. Source: **Electro-Technical Labs, 5134 Glenmont, Houston, Tex., U.S.A.**





New type potentiometer

. . . for industrial-process use has been developed which adapts a strain gage as the rebalancing element. Tradenamed ElectroniK 17, the potentiometer uses the strain gage (called a Stranducer) instead of the conventional slide wire. This feature is said to permit infinite resolution for, unlike the slide wire, the number of points at which a potentiometer can come to balance is not limited to the number of turns on a slide wire.

Initially, the potentiometer will be produced in single-pen strip and chart recorders, and a circular-scale indicator, each with or without control.

The instrument is designed so the Stranducer varies the output potential of the measuring circuit to balance the input signal from the process variable. Four prestressed looped-wire strands enclosed in an I-shaped frame form the variable-resistance legs of the measuring circuit. Their resistance varies in proportion to the tension applied to them. Source: **Minneapolis-Honeywell Regulator Co., Brown Instruments Div., Wayne & Windrim Ave., Philadelphia 44, Pa., U.S.A.**

●

Heat-recovery evaporator

. . . is available that permits use of engine jacket water as the heat source to convert salt or brackish water to fresh water. The Aquavap evaporator operates under vacuum so that the raw water is boiled at about 125° F.

The units come in capacities from 500 to 12,500 gal. per day. They are designed to be exceptionally

Want more facts about equipment or copies of product literature described in this issue?

Send this **Showcase Coupon**

to manufacturer at address shown in bold type after each item.

Product name, Model no., literature title or number: .....

.....

Described in OIL and GAS **JOURNAL** - Issue of **February 27, 1961**

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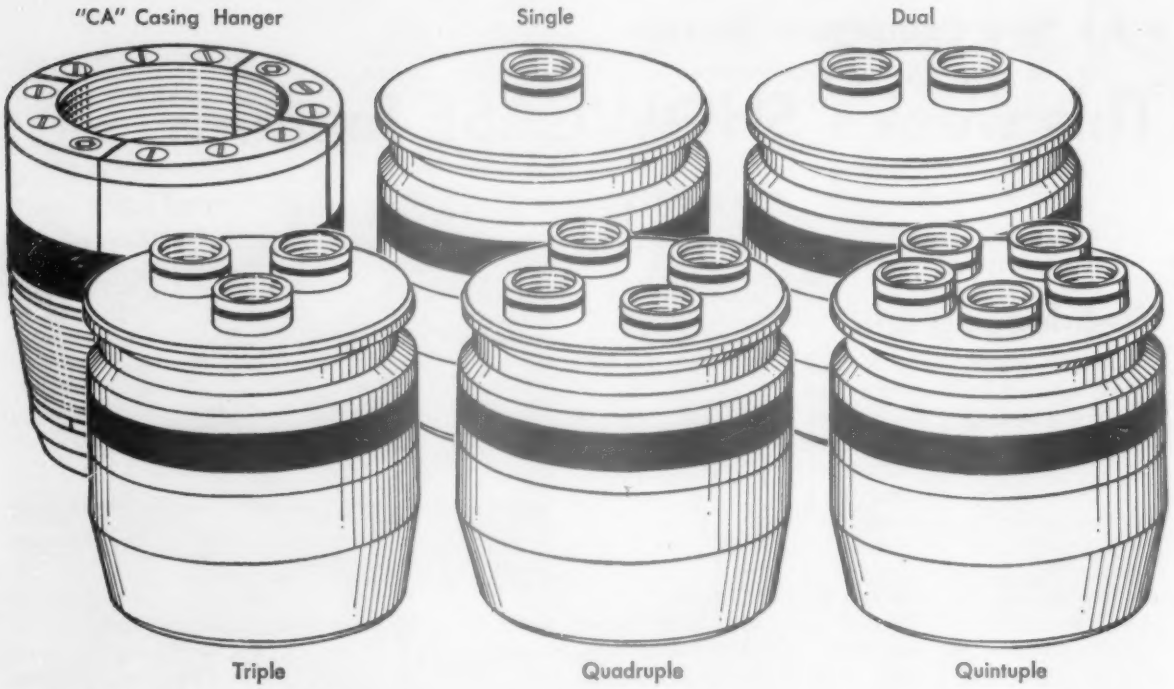
CITY..... STATE.....



CAMERON ALL-PURPOSE HEADS

If there is any question about the number of strings you will use, Cameron "All-Purpose" Heads provide the answer. Since all hangers – slip or mandrel type – of a given size are interchangeable in the same size housing or spool, you have complete versatility. We have casing and tubing hangers for suspending and sealing in any well – high pressure or low – shallow, deep, or in between – single, multiple, or tubingless. This freedom of choice means big savings in time and tempers, so, on your next well be sure it's

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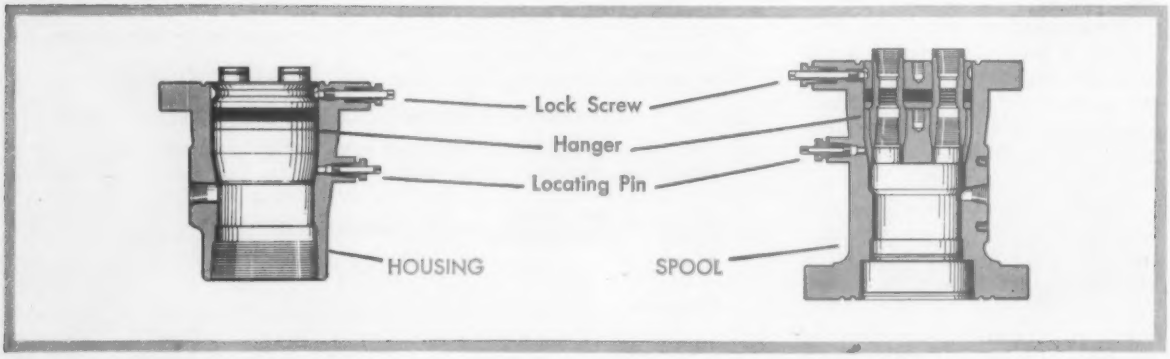

SHOWCASE . . .

New Equipment

compact. A unit producing up to 500 gal. per day measures less than 4 ft. high and requires a space less than 2 by 3 ft. Virtually automatic in operation, the evaporator comes as a packaged unit, ready to install. Source: **American Machine & Foundry Co., Maxim Exaporator Div., 6 Mill Lane, Waterford, Conn., U.S.A.**

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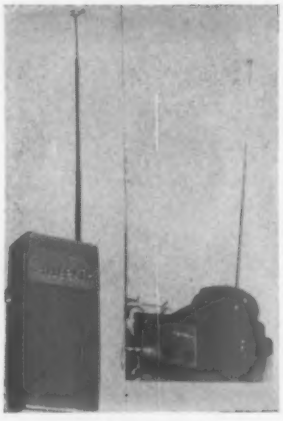

Miniature transceivers

. . . recently developed comprise a pocket-size unit and a base-station transceiver. The Model PM-A pocket-size unit is completely transistorized and weighs only 12½ oz., complete with a 9-volt battery. It measures 2¾ in. wide, 5¾ in. high, and 1⅜ in. deep. Features include a telescoping antenna that retracts into the case and extends 40 in. and a 2½-in., 8-ohm speaker-mike combination which, the maker claims, provides exceptional clarity, both while transmitting and receiving, without voice distortion. A jack at the top permits private listening with an earplug. Range of the unit is reported to be ½ mile or more, depending upon the surrounding area.

The Model SC-A base-station transceiver provides an operating range of 1 mile or more, the maker says. It measures 7 in. wide, 3 in. high, and 4 in. deep, less optional power supply. It is available for operation on any single channel between 20 and 55 mc. Source: **Seiscor Div. of Seismograph Service Corp., Box 1590, Tulsa, Okla., U.S.A.**

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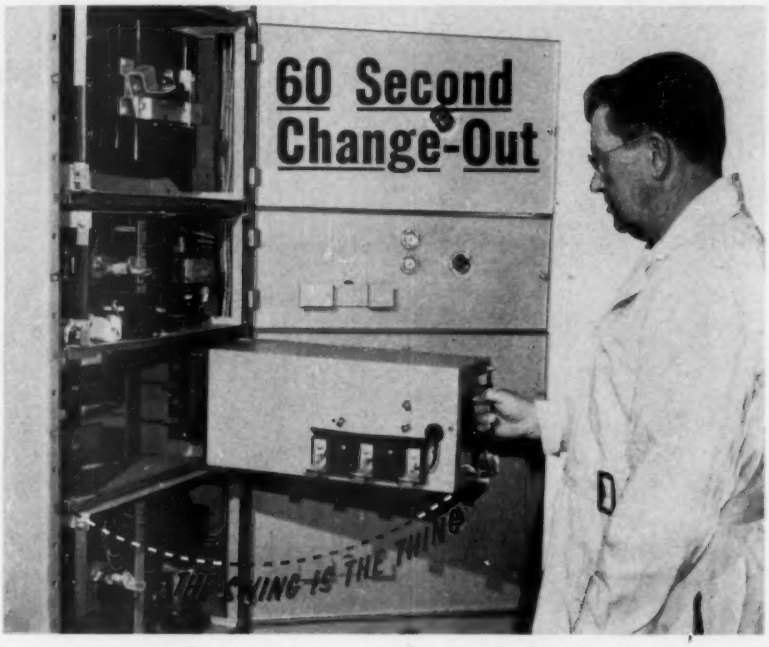

60-seconds or less is all the time required to change-out a starter or circuit breaker in the new Nelson AUTOMATROL motor control centers.

No tools, no specially trained personnel are required. You simply open the door, release the safety latch, swing the unit out and lift it off the pin hinges. You install the new unit just as easily. What could be more important when production is stopped?

This is only one of many new features found in Nelson AUTOMATROL motor control centers that are designed specifically for automation systems. For complete information write for Bulletin 2001 or call your local Nelson representative.

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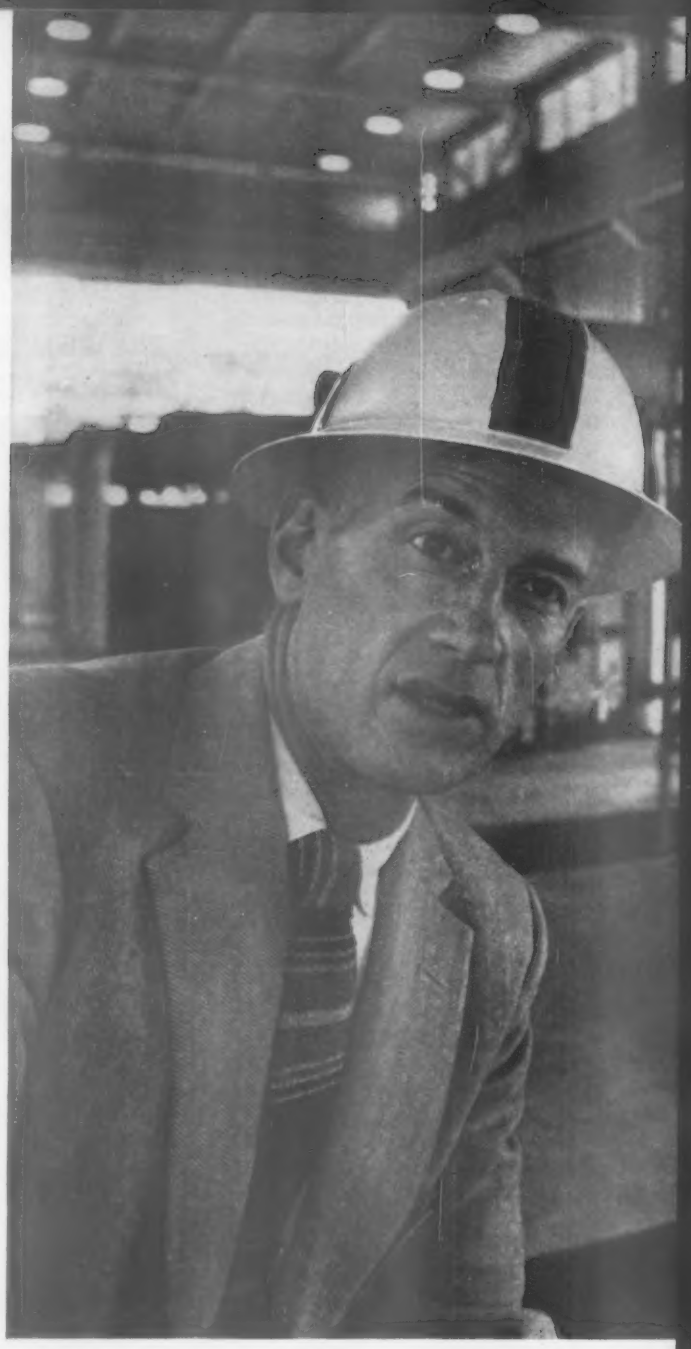
Report from Tidewater...

How Cooper-Bessemer hydrogen boosters supply 800 psi 'round-the-clock



At Tidewater Oil Company's refinery south of Wilmington, Delaware, two Cooper-Bessemer FM-2 compressors play a vital part in the hydrogen treatment process by which the refinery upgrades a number of products and intermediate fractions. These hydrogen boosters operate 24 hours per day, boosting 690 cfm of hydrogen at 470 psi to a discharge of 800 psi. This hydrogen is delivered directly to the desulfurizers.

These Cooper-Bessemer compressors have performed well under this heavy-duty service. Maintenance costs and outage time have been low.

The customer is also pleased with the performance of three Cooper-Bessemer air compressors which supply utility air to the entire refinery on a 24-hour, 365-day per year basis.

Find out how Cooper-Bessemer products can help assure dependable compression and optimum economy for *your* processing. Call our nearest office for help in planning of your facilities.

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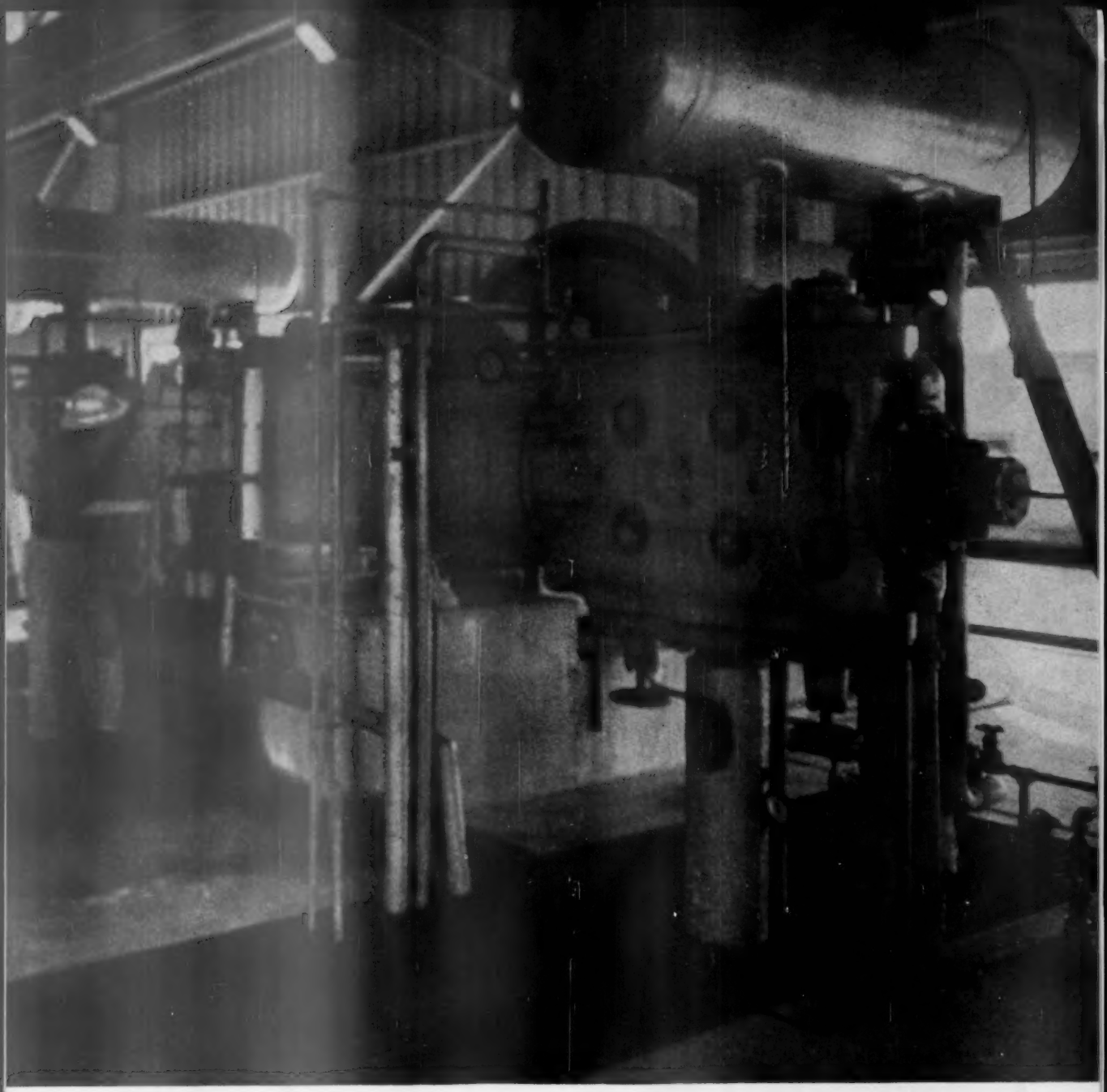
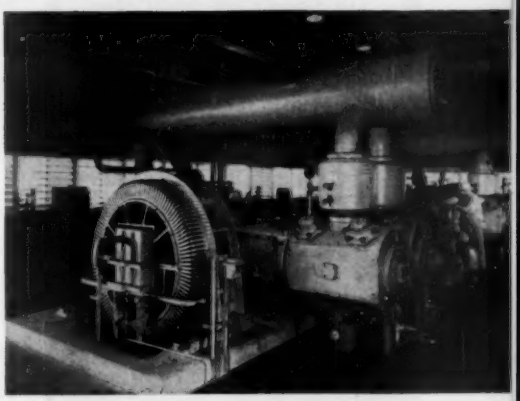


Cooper-Bessemer FM-2 Hydrogen Compressors at Tidewater Refinery. Rated 690 cfm, suction 470 psi, discharge 800 psi.

Three Cooper-Bessemer Air Compressors at Tidewater. They supply utility air at about 120 psi for processes throughout the refinery.



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Packaged water-flood unit

. . . mounted on a skid has been developed which is powered by a slow - speed, single - cylinder, two-cycle gas engine direct - connected through a flexible coupling to a triplex pump. Pump capacity can be varied from 4,480 bbl. per day at 560 psi. to 1,530 bbl. per day at 1,645 psi.

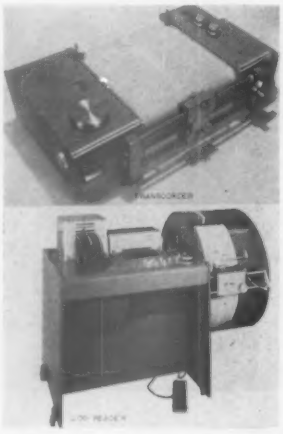
The engine also drives a centrifugal backwash pump rated at 600 g.p.m. and a 150-g.p.m. transfer or filter pump by means of V-belt drives from the engine-clutch shaft and triplex-pump shaft extension.

Other equipment on the 7 by 20-ft. skid includes an 8 by 3½-ft. permeable-plant type of filter, butterfly-valve type of manifold with gear-operated crank to open and close four valves in unison, interconnecting piping, safety controls, and pulsation dampeners. Source: **National Supply Div., Armco Steel Corp., Two Gateway Center, Pittsburgh 22, Pa., U.S.A.**

Dual-completion valve

. . . is available which is designed to serve as a surface-controlled annulus valve for emergency shutoff. Designed for use where the casing annulus is used as a flow conductor, it can be installed in tubing 200 ft. below the wellhead, the maker says. One-eighth-in. tubing can be extended to the surface for pressuring the valve open.

Slips can be set by pressuring the tubing string at the surface, enabling the packer element to be appropriately loaded, the maker says. Other features listed for the valve include the design of the packer and piston to provide generous annular flow area with the outside exposed to surface-controlled pressure and the inside exposed to flowing pressure. During emergencies, pressure is vented through conventional systems and well pressure closes the valve. Source: **Page Oil Tools, Inc., P. O. Box 7097, Long Beach, Calif., U.S.A.**



Seismic data transcribed

. . . from paper records onto magnetic tape with this new Transcorder. The instrument will also transcribe recorded data from one size of magnetic tape to another and, with an accessory log reader, will transcribe well-logging data to magnetic tape for use in seismic data-reduction equipment, the maker says. A reproduction of the seismic trace being transcribed can be produced simultaneously for checking purposes.

The transcribing device is claimed

what makes an acid treatment profitable?

In Oklahoma, a Dowell-engineered acid treatment gave the desired production increase, yet cost $1350 less than treatments used on other wells in the same field.

In Utah, Dowell-engineered acidizing boosted well production from 34 to 450 bopd in a field where other acid treatments had broken through to water.

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The one difference that towered above all others is engineering. Dowell designed each treatment to fit well conditions and the operator's needs. The result was extra profit.

Dowell is well-qualified in the kind of engineered treatment design that results in excellent profit increases.

Dowell developed the Acid Guide* — a new method for designing treatments and predicting probable results. Several thousand successful acid jobs have been designed with the help of the Acid Guide within the past two years.

Dowell has an unsurpassed fund of data on formation and fluid characteristics from many fields. This information is necessary for scientific treatment planning but it is often not available from individual operators.

Dowell has a large variety of acid additives as well as collateral products and services to improve results from acid treatments.

To summarize, Dowell has the experience, the information, the acid additives, the collateral products and services, the technically-trained personnel and the laboratory facilities to design engineered acid treatments. Results have been high success ratios and satisfactory payouts on investments.

There *is* a difference in acidizing services. Dowell services and products are offered from more than 150 offices and stations in the United States, Canada, Venezuela, Argentina, Germany, France and the Sahara area. Dowell, Tulsa 1, Oklahoma.

*DOWELL SERVICE MARK

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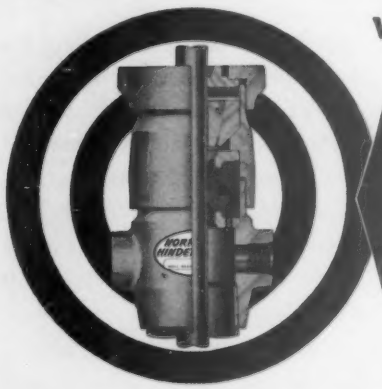

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New Equipment

to permit geophysicists to apply modern data-analysis techniques to paper-recorded seismic data without the expense of reshooting a previously explored area. In some cases, this may permit analyses of areas that are no longer open to geophysical exploration.

Magnetic tapes produced by the unit can be processed by seismic data reduction systems that permit mixing, selective filtering, correcting for moveout, weathering and elevation, and plotting cross-sections by the conventional trace, variable-area, or variable-density methods. Source: **Electrodynamic Instrument Corp., 1841 Old Spanish Trail, Houston 25, Tex., U.S.A.**

●

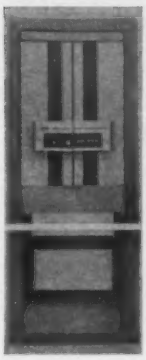
Thermoelectric generator

. . . available for industrial use comes in four ratings: 5, 10, 50, and 100 watt. The generator is reported to be completely static and suited for use in remote locations. Potential uses include cathodic protection of pipelines, valve control, and powering of microwave relay equipment.

The units can be designed to use any type of fuel such as gasoline, propane, or natural gas, the maker says. Cooling can be by forced air, natural convection, or water.

Basically, the generators have low-voltage, high-current, d.c. outputs. But static inverters or converters can be used to obtain a d.c. or a.c. output rating. The basic outputs of the four presently available units range from 1.7 volt at 4.0 amp. for the 5-watt unit to 9.4 volt at 13 amp. for the 100-watt unit. Source: **Westinghouse Electric Corp., Box 2278, Pittsburgh 30, Pa., U.S.A.**

Mobile computer system



. . . to monitor chemical-process performance has been developed. The first system, developed for a chemical company, will be installed in a van for completely mobile operation.

The data-acquisition and computing system incorporates the maker's PB 250 digital computer to provide on-site data-processing capabilities not previously available in mobile equipment.

The system accepts analog data from up to 60 sources. The data are converted to digital form for computation by the computer. Resultant information is then recorded on magnetic tape. The system can energize alarms, make logical decisions, and provide information for a logging typewriter or a paper-tape punch. Source: **Packard Bell Computer, 1905 Armacost Ave., Los Angeles 25, Calif., U.S.A.**

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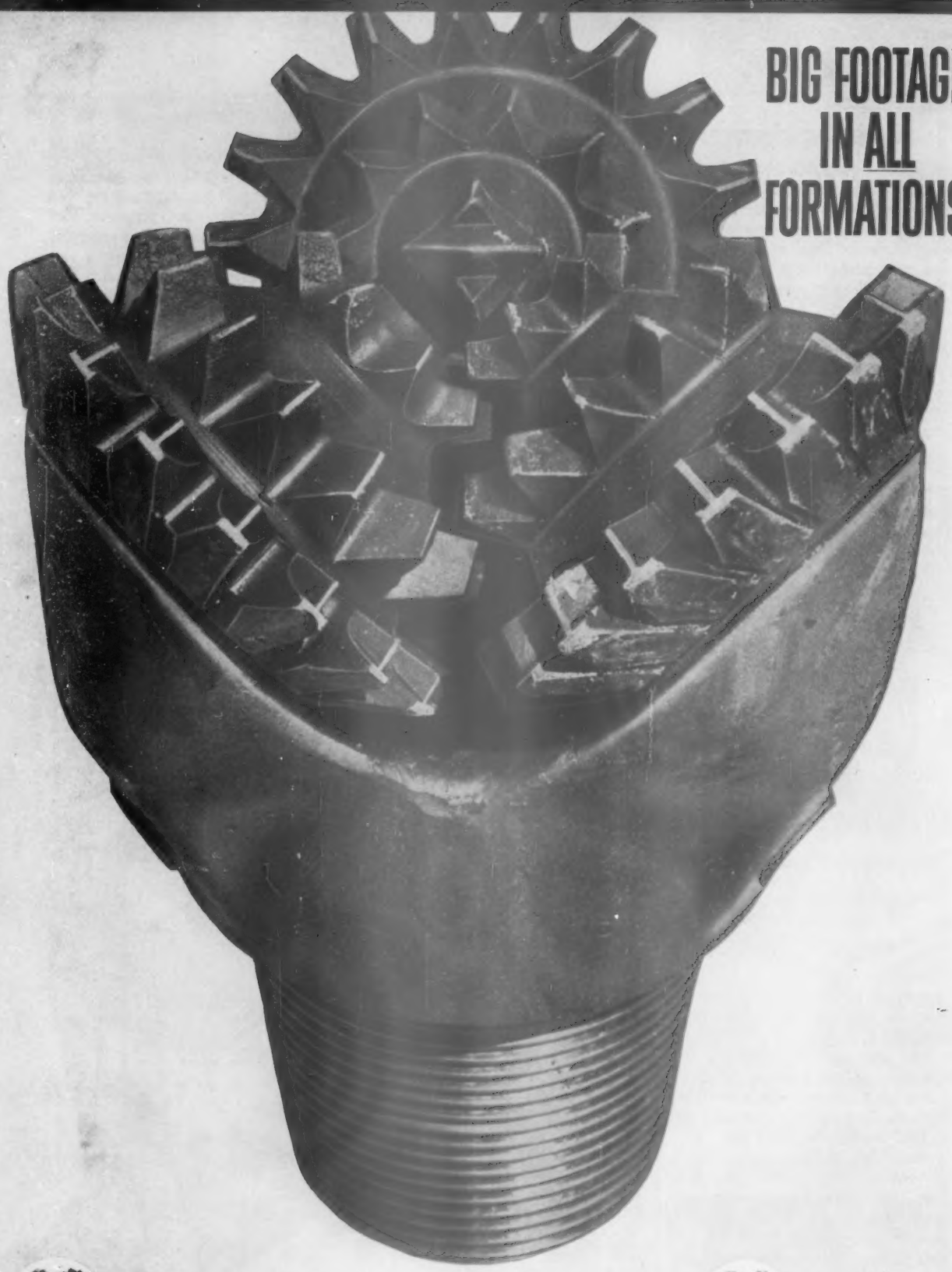
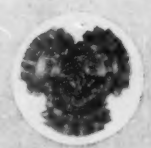
BIG FOOTAGE IN ALL FORMATIONS





TYPE ES—salt, red beds, gypsum, anhydrite, unconsolidated shales, medium-hard limestones.

TYPE EM—hard shales, sandy shales, hard limestones, anhydrite.

TYPE EH—chert, quartzite, granite, flint, novaculite, pyrite bearing quartzite, basalt.

CHICAGO PNEUMATIC · OIL TOOL DIVISION · FORT WORTH, TEXAS

BIG FOOTAGE IN ALL FORMATIONS

The only true measure of a Rock Bit is its ability to make hole! . . . These factors are *musts* for high penetration performance:

OUTSTANDING METALLURGY that insures long wear of cones and journals . . . maximum resistance to chipping and breakage of bearings under shock loads.

DYNAMIC DESIGN that insures effective tooth-to-tooth and tooth-to-groove clearances . . . maximum bearing areas to withstand heaviest bit loading.

QUALITY + MANUFACTURING that sets and maintains precision standards worthy of these experience-tempered, field-proved designs.

The "CP" of Chicago Pneumatic is recognized as the symbol of "Cost-cutting Performance" by top drilling contractors. 41 conveniently located Warehouses insure 'round-the-clock delivery.

Chicago Pneumatic

FT. WORTH, TEXAS

BITS • DRILL COLLARS
REAMERS • TOOL JOINTS

SHOWCASE . . .

New Literature

Free measuring stick

. . . now being offered is a mechanical aid to facilitate the measurement of tower-site latitude and longitude from commonly used maps. It's basically a ruler with various scales to quickly and accurately measure latitude and longitude from sectional aeronautical charts, and three scales of USGS maps. Source: **Decibel Products, Inc., Box 10764, Dallas 7, Tex., U.S.A.**

Combination cleaner-snubber

. . . the Type SDF, is covered in a new six-page bulletin just released. The unit is designed to be used in place of separate air-intake filters and silencers for reciprocating compressors, positive-displacement blowers, and naturally aspirated or positively scavenged gas or diesel engines. The combination unit offers substantial advantages by eliminating extra piping, and operation and maintenance of separate equipment for air-intake cleaning and silencing, according to the literature. Source: **Industrial Silencer Div., Burgess-Manning Co., 9207 Sovereign Row, Dallas 7, Tex., U.S.A.**

Ball joints

. . . solve piping problems as detailed in new eight-page Catalog 250, just published. It tells how you can easily provide for movement and flexibility in metal piping with simple ball joints. Advantages offered include simplification of engineering, elimination of involved pipe-stress calculations, space savings, and reduction in pipe anchors or supports required. Illustration of five basic motion principles of ball joints serve as the key to examples of how to provide safe flexibility in piping subject to contraction and expansion. Source: **Barco Mfg. Co., 501 Hough St., Barrington, Ill., U.S.A.**

Free "zone finder" being offered

. . . is said to provide an easy way of locating possible oil or gas zones recorded on sonic and induction electrical logs. A circular slide rule, it substitutes for charts which may confuse operators not familiar with detailed log interpretation. The zone finder compares the travel time (Delta T) from the sonic log with true resistivity (Rt) from the induction electrical log to point out oil and gas-bearing zones and those zones which should be investigated further by sidewall coring or formation testing. Source: **Schlumberger Well Surveying Corp., 5000 Gulf Freeway, Houston, Tex., U.S.A.**

X-rays for analytical problems

. . . is the topic of a four-page folder, reprinted from The Oil and Gas Journal, which gives details on new X-ray analytical methods for use on lubricating oils, crudes, distillates, residuals, additives, and cracking catalysts. Illustrated with photos and graphs, the article covers central control, sample preparation, sample cells, and how the method works. It tells how a 60-kv. unit is used in conjunction with a 100-kv. installation to divide the work load. An inexpensive method is cited for preparing sample cups from glass cylinders and polyester film. Source: **Philips Electronic Instruments, 750 S. Fulton Ave., Mount Vernon, N. Y., U.S.A.**

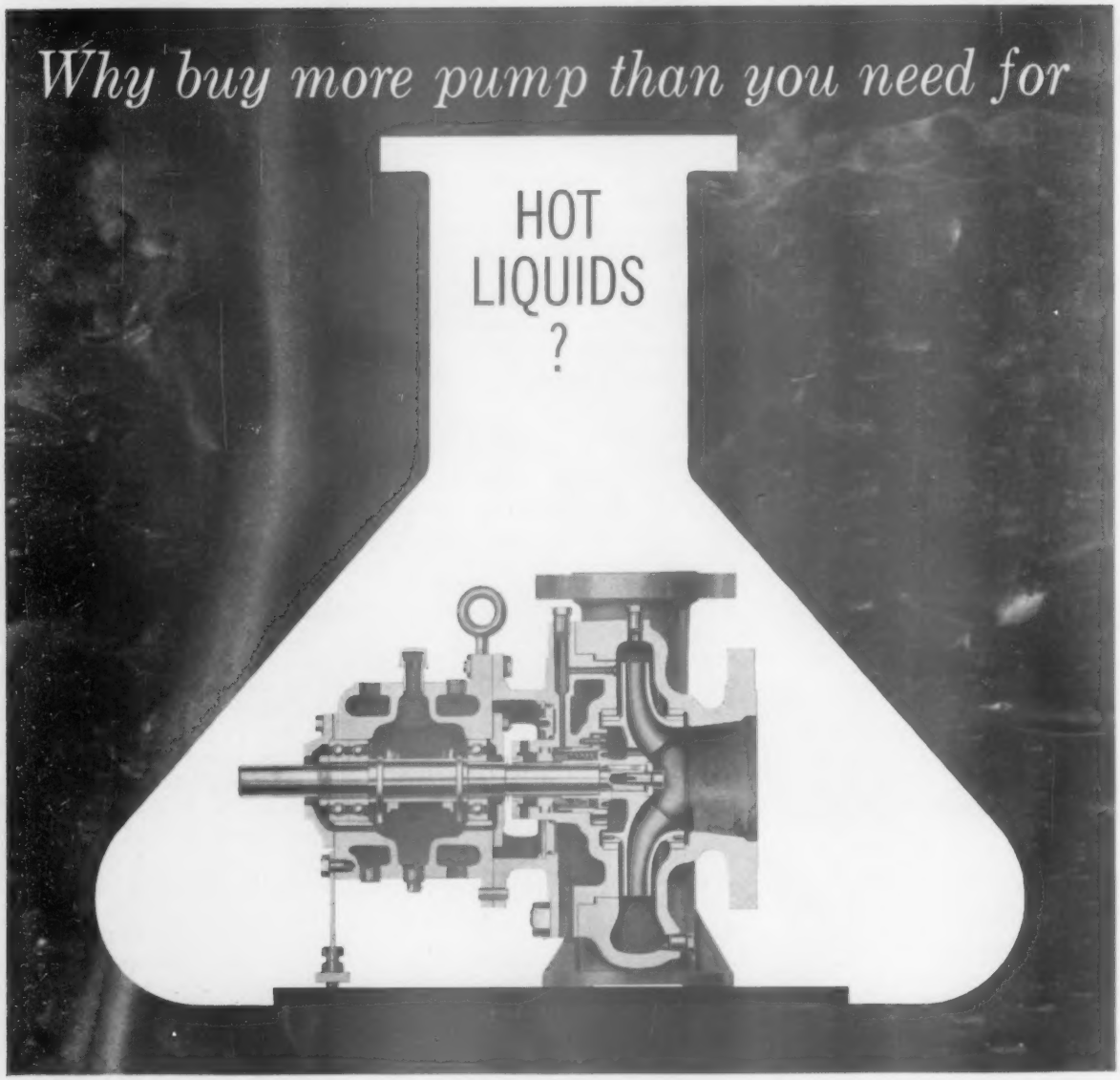
Computer bulletin

. . . describes principal chemical-engineering applications of the Bendix G-15 computer. The report contains a compilation of various programs for petroleum and chemical firms, as reported in a recent survey. Included is a partial inventory of the several hundred programs made available to G-15 users through an exchange library. Source: **Computer Div., Bendix Corp., 5630 Arbor Vitae St., Los Angeles 45, Calif., U.S.A.**

Glassed-metal pipe, valves

. . . and fittings are outlined in new 16-page Bulletin 987 now available. It contains cutaway drawings and complete specifications and dimensions for all components discussed. Special attention is given to F-C (field cut) Glasteel pipe and a series of photos shows four steps required for its use in the field—cutting, threading, fire polishing, and sanding. Source: **Pfaudler Co., 1126 West Ave., Rochester, N. Y., U.S.A.**

Why buy more pump than you need for



You take two big bites out of costs when you buy a Goulds Pump that *fits* your hot pumping service. You don't pay for more pump than you use—yet you have expensive pump features that keep maintenance costs down.

The Goulds Model 3775 handles liquids *as hot as 750°F*—and pressures up to 600 psi. Gives you all these features:

1. Cooled seal. Hot pumpage never touches the mechanical seal—because the seal is isolated in its chamber and surrounded by cool, dead-ended liquid. Coolant circulates through jacket to keep seal face to 250°, even when pumpage reaches 750°. A simple adjustment lets you change to external flush or heat exchanger cooling.

2. Cooled feet. Alignment stays true regardless of temperature variations because of centerline mounting and tapped inlet and outlet connections that permit circulation of cooling liquid.

3. Cooled bearings. Water-cooled housings maintain constant bearing temperature for longer life.

BACK PULL-OUT FOR EASY UPKEEP. A millwright alone can remove rotating parts without disturbing pipe connections or driver.

You get maximum economy in spare parts inventory, since all twelve sizes are built on the same bearing frame—one size bearings, shaft and seal for all pumps.

The husky Model 3775 is built to API specs, with a vertically split casing. Capacities go to 1200 gpm and heads to 500 feet.

Bulletin 724-1 gives you a more complete look at how Model 3775 can help you cut costs on hot pumping services. It contains specifications, construction details, pressure-temperature chart, and other helpful information. Write to Goulds Pumps, Inc., Dept. OG-J-21, Seneca Falls, N. Y.

GOULDS PUMPS

▶ ▶ ▶ Equipment Men Notes

Tom S. Andrews, Jr., appointed

T. S. Andrews, Jr.

. . . product manager of Hamer products for Well Equipment Mfg. Corp., Houston, according to John W. Gates, vice president and sales manager. In his new position, Andrews will coordinate sales activities on Hamer blind and plug valves through representatives in the United States.

For the past year, he was a sales representative for Weco in the Texas and Louisiana Gulf Coast area. For 12 years prior to joining Weco, he was sales representative for Tom S. Andrews Co., of Oklahoma City, manufacturers representative for Hamer products in the Mid-Continent area.

Alvin Dill retires from Axelson

A. A. Dill

. . . according to Richard D. O'Brien, vice president in charge of oil - field - equipment divisions of U. S. Industries, Inc. Earl T. Saulsbury succeeds Dill as export sales manager. Dill joined Axelson Mfg. Co. in 1925; the company became a division of U. S. Industries in 1952. Dill helped found the New York Chapter of Nomads and held posts of chapter president, regent of New York chapter, and national chairman.

Pipe Line Technologists makes

. . . a series of major changes in managerial personnel for the Houston company's domestic and foreign operations, according to Herbert E. Fisher, president.

Thomas M. Thawley is being assigned to The Hague, the Netherlands, as manager of European operations replacing Richard S. Barfield who is returning to the Houston headquarters office, after 2 years in Europe, to assume duties of supervising engineer design. Thawley, who joined Pipe Line Technologists early last year, previously was with Trunkline Gas Co., Houston, and Panhandle Eastern Pipe Line Co., Kansas City.

T. M. Thawley

R. S. Barfield

O. C. Mudd

T. L. Guerry

O. C. Mudd, former chief corrosion engineer for Shell Pipe Line Corp., Houston, has accepted an assignment in Sydney, Australia, to assist Milton E. Worlow, manager of Australian operations for Pipe Line Technologists (Orient), S.A. Mudd will supervise corrosion-engineering activities on several Australian projects. Theodore L. Guerry, manager of Venezuelan operations with headquarters at Maracaibo the past 3 years, is being returned to the United States for reassignment in the Houston home office.

S. A. Bunis is sales manager

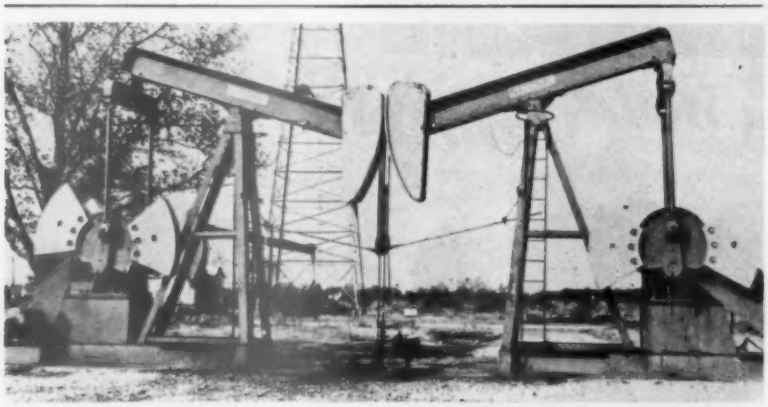
S. A. Bunis

. . . of Goulds Pumps, Inc., Seneca Falls, N. Y. Associated with the company for 23 years, he held the position of assistant sales manager the past 4 years. Bunis was a sales representative in the New England and Middle Atlantic territories prior to moving to Goulds' headquarters office in 1953.

Chenault, Armstrong are named

. . . area managers in Canada and the Rocky Mountain territories, respectively, by Oil Well Supply Division of U. S. Steel Corp., reports W. A. Weir, vice president in charge of sales. James E. Chenault, Jr., who will be located in Calgary, was employed by Oil Well in 1948. He was transferred to Edmonton as assistant district manager in 1957, and became district manager 2 years later.

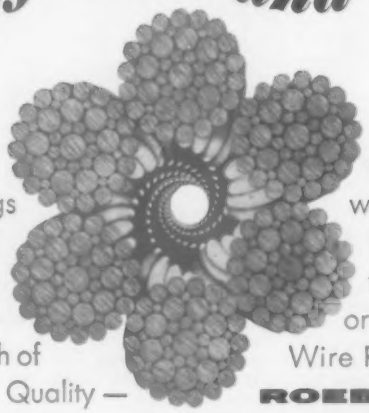
R. L. Armstrong will locate in Denver, site of the new Rocky Mountain headquarters, until now situated in Casper, Wyo. He began with the division in 1936 at Lusk, Wyo., was transferred to Denver in 1938 as a sales engineer, and in 1940 to Casper as district sales manager. In 1946 Armstrong was



INDEPENDENT OPERATION of these two pumping units in a well cased with 5½-in. pipe was made possible for J. C. Cullinan at Humble, Tex., by two special carrier bar and bridle assemblies and two special stuffing boxes for use with 2 1/16-in. tubing. The equipment was fabricated for the Houston store of National Supply Division, Armco Steel Corp., by Huber Corp. and Johnson Fagg Corp. in Houston. The pumping units are National Type E-18 with electric-motor drive and structure rating of 15,200 lb., having a maximum stroke of 64 in. Two 1½ by 1¼ by 16-ft. Fluid Packed pumps are used.

We put a lot of work into it
You get a lot of work out of it

quality inside and outside



Take a good look at the pictures. They show you where your savings really start — with the inner and outer uniformity of wires and strands. Unseen, but of utmost importance is the *extra* high strength of Roebling Royal Blue Wire Rope. Quality — inside and outside — is the extra working factor that pays off on the job for *you*. Find out more from your wire rope distributor, or write for free booklet to Roebling's Wire Rope Division, Trenton 2, N. J.

ROEBLING

Branch Offices in Principal Cities
John A. Roebling's Sons Division
The Colorado Fuel and Iron Corp.

appointed manager of the Rocky Mountain area, and in 1959 was shifted to Oilwell Supply Co., Ltd., in London, where he served as a director until his recent return to the states.

Porta-Kamp Mfg. Co., Inc. moves . . . into its new expanded plant at 3601 W. 12th St., in Houston, according to Floyd E. Bigelow, president. Porta-Kamp manufactures portable and collapsible buildings for permanent and semi-permanent field housing.

The plant contains in excess of 28,000 sq. ft., including offices and a display room. According to Bigelow, Porta-Kamp is now in a position to mass produce any of its units on a new assembly line. The assembly system, coupled with the convenience of the Port of Houston, is expected to greatly speed operations.

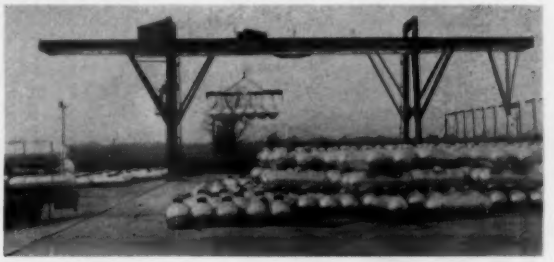
R. V. Whitty is district manager . . . of the Tulsa oil-field division office of Hagan Chemicals & Controls, Inc., of Pittsburgh. He joined the firm in 1956 as a sales engineer. A combined sales and service office, the Tulsa location handles all activities of Hagan's Oilfield Division in Oklahoma and Kansas.

Bethlehem Steel Co. appoints . . . Richard S. Hostetter to manager of industrial fastener sales, succeeding Jay C. Miller, who held the post since 1932. Hostetter has been with the organization since 1935. He was assigned to the Philadelphia sales office in 1937. In 1957 he was named assistant manager of industrial fastener sales.

Archer Wombacher becomes

A. Wombacher

. . . general sales manager of Information Systems, Inc.'s Panellit Division, Skokie, Ill., announces Howard Hudson, Panellit marketing vice president. Wombacher previously was sales manager for Panellit Service Corp. He now will direct all sales activities involved with the division equipment and service operations, including the fabrication of control boards, manufacture of Panalarm annunciator systems, and the instrument systems engineering, construction, and contract maintenance services offered by Panellit Service Corp.



BIG CRANE covers the entire yard of Master Tank & Welding's plant at Quincy, Ill. This new crane, with a 160-ft. span and a 400-ft. runway, enables trucks to be loaded in one-third the time it took in the past. At one lift eight 500-gal. or six 1,000-gal. tanks can be handled simultaneously.

CORRECT BALANCE

. . . easily and exactly!

For peak efficiency a well must be correctly balanced. The deeper the well the more important correct counterbalance becomes.

Even small changes in well conditions can result in power waste and unnecessary wear and damage if a pumping well is not properly balanced.

Correcting the adjustment on this JENSEN Rotary Balanced JACK is such a simple one-man job there is no excuse for any well to ever be improperly balanced—whether deep or shallow.

Get the money-saving facts on JENSEN JACKS before you equip that next well.

STOCKED BY YOUR LOCAL SUPPLY STORE

Made by JENSEN BROS. MFG. CO., INC., P. O. Box 477-F, Coffeyville, Kansas
Export Office: 250 Park Avenue, New York 17, N. Y.

JENSEN JACKS

NOW

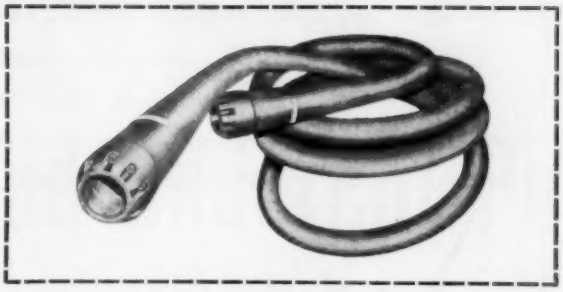
A SINGLE ROTARY HOSE for Drilling with:

MUD
AIR
GAS
GAS & MUD

R/M OIL FIELD PRODUCTS GIVE YOU "MORE USE PER DOLLAR"

RAY-MAN CBL ROTARY HOSE
Is Engineered For ALL Drilling Methods

New techniques for drilling with air or gas as a circulation medium are increasing in use. These improved methods call for a rotary hose built for alternate service with oil-base muds, air, gas, or a combination of gas and mud. Ray-Man Rotary Hose has built-in engineered qualities and features to assure long, safe, dependable rig performance *regardless* of the methods *you* use.



ADVANTAGES

- **Withstands high velocity heated air and gas to 160° F.**
- **Maximum resistance to abrasion from dry drilling during reverse circulation to clear bits.**
- **High resistance to sand abrasion when used with gas direct from natural wells.**
- **High-tensile steel cable wire reinforcement gives strength *plus* flexibility to withstand high pressures.**
- **Holds steady in the derrick *without* whipping, handles easier, has high resistance to accidental crushing.**
- **Exclusive built-in coupling with leak-proof "Lip-Lok" feature tightens under pressure for safety, has no protruding lags to cause fouling.**
- **Features oil-proof Neoprene tube and cover.**

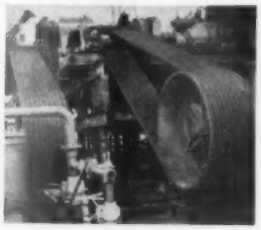
Ray-Man CBL Rotary Hose is *the hose* for *all* drilling service. Write for Bulletin M651.

R/M POLY-V® DRIVES

More Power in Less Space ... with Reliability

No other drive puts as much extra push in deep hole drilling as the exclusive, patented R/M Poly-V! Delivers much more power than a V-drive of equal width...or equal power in much less width. Single unit belt design eliminates belt matching problems in the field . . . reduces field inventories. Just *two* belt cross sections meet every heavy duty drive requirement. Maintains groove shape, complete contact pressure. Write for Poly-V Drive Bulletin M141.

Convert to Poly-V and be SURE!



CONDOR LS V-BELTS

Length Stabilized

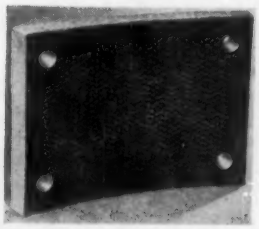
No whip, no wobble, no weave —no undue stress or V-belt turnover on long center, heavy duty oilfield drives! Condor LS V-Belts are *length stabilized* to give a degree of lateral and longitudinal stability *without stretch* never before possible. They're length *certified*, too . . . measured, tagged and vacuum packaged to assure positive length control and freshness from factory to field to drive. Condor LS V-Belts come matched—stay matched to outperform, outlast any other V-belt under the heaviest loads. Write for Bulletin M210.

R/M "TEFLON" PACKINGS*

Highly Acid Resistant

When you use R/M "Teflon" braided and asbestos packings you can forget the kind of troubles that you normally experience from strong acids and corrosive liquids. "Teflon" is completely chemical resistant except to fluorine and chlorine trifluoride at high temperatures and molten alkali metals. No known solvent will act on it—no acids or caustics will attack it. It is nonadhesive and thus excellent for applications involving viscous materials. Write for information.

*A Du Pont Trademark



RAY-MAN BRAKE BLOCKS

Make Hole Faster

Long lasting Ray-Man 635-D Brake Blocks cost less because they wear longer. Made of extra-large asbestos yarns, special saturant, wire reinforced. Resist bleeding, won't glaze or carbonize. Ray-Man Blocks are available in drilled or countersunk sets or in the R/M patented Key-Lok style. Make hole faster. Cut cost with Ray-Man. Call your nearest R/M warehouse today or contact your closest authorized R/M oilfield equipment supply store—there is one located in every major oil producing area.

RM108

RAYBESTOS-MANHATTAN, INC.

PASSAIC, NEW JERSEY

"wherever oil men gather"

When oil men discuss the *"what, why* and *where"* of oil activity . . . the conversation eventually gets around to the *"how."* That's when you hear this oft-repeated phrase: "For my money, it's . . . THE FORT WORTH NATIONAL BANK."

THE
Fort Worth National
BANK

Helping Build a Greater Fort Worth and Southwest

MEMBER FEDERAL DEPOSIT INSURANCE CORPORATION
CAPITAL AND RESERVE ACCOUNTS OVER $24 MILLION

Westinghouse Electric combines . . . its small steam turbine and industrial gas-turbine departments into a single department, according to W. C. Rowland, vice president and general manager of the company's Steam Division. The new department will be headed by R. C. Twombly, former manager of the small steam turbine department and acting manager of the industrial gas-turbine department. J. D. Moise will be his assistant.

K. S. Kramer and F. Anthony are the engineering and sales managers for the new department. Previously they held the same posts in the small turbine department. E. J. Fogel, former manager of manufacturing for the industrial gas-turbine department, is the manufacturing manager for the combined departments.

Polyken Sales Division assigns . . . William J. Flaherty, former eastern regional manager for Polyken protective coatings, to the newly created position of Houston manager. Donald W. McCabe, who assumes Flaherty's former job, joined Polyken in 1953 in a field sales responsibility. He was transferred to Kendall Co. Canada in 1956 to work in merchandising. McCabe rejoined the domestic operation of Polyken protective coatings in 1958 and has been assistant merchandising manager since 1959.

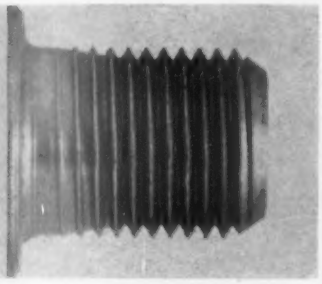
HUGH MAINLINE gate valve to be installed in the new 1,400-mile Alberta-California natural-gas pipeline project, is being shipped out by Grove Valve & Regulator Co., Oakland, Calif. subsidiary of Walworth Co. The 36-in. valve weighs more than 28,000 lb. and will stand about 20-ft. high when the "operator"—or control mechanism—is installed at the job site.

. . . another Jones First

JONES

Rolled-Thread Undercut Pin

Greater Strength–Easier Make-Up



API Cut Thread
Most susceptible to fatigue is thread root area, where notch effect exists.

Jones Rolled Thread
Mirror-like surface aids application of make-up torque to adequately pre-stress joint.

Rolled threads, made by cold working or displacing the metal into the thread form, are stronger at the very point where most cut-thread pin failures originate. Steel fibers and grain are rearranged to follow the thread contour, providing a dense structure at the critical thread root . . . added strength where it is needed most. Additional fatigue resistance is obtained by undercutting the pin shank, thereby eliminating the run-out thread and improving the elasticity of the joint. The superior finish and gauge tolerances attained in Jones rolled-thread sucker rod pins reduce friction and make possible greater prestressing of the joint with equal torque.

Ask your Jones representative for complete information on this new Jones development.

THE S. M. JONES COMPANY

Division of Buffalo Eclipse Corporation
General Office and Factory: TOLEDO, OHIO
Sales Office: Enterprise Building, TULSA, OKLAHOMA
Export Department: The S. M. Jones Company

JONES SUCKER RODS

advanced engineering

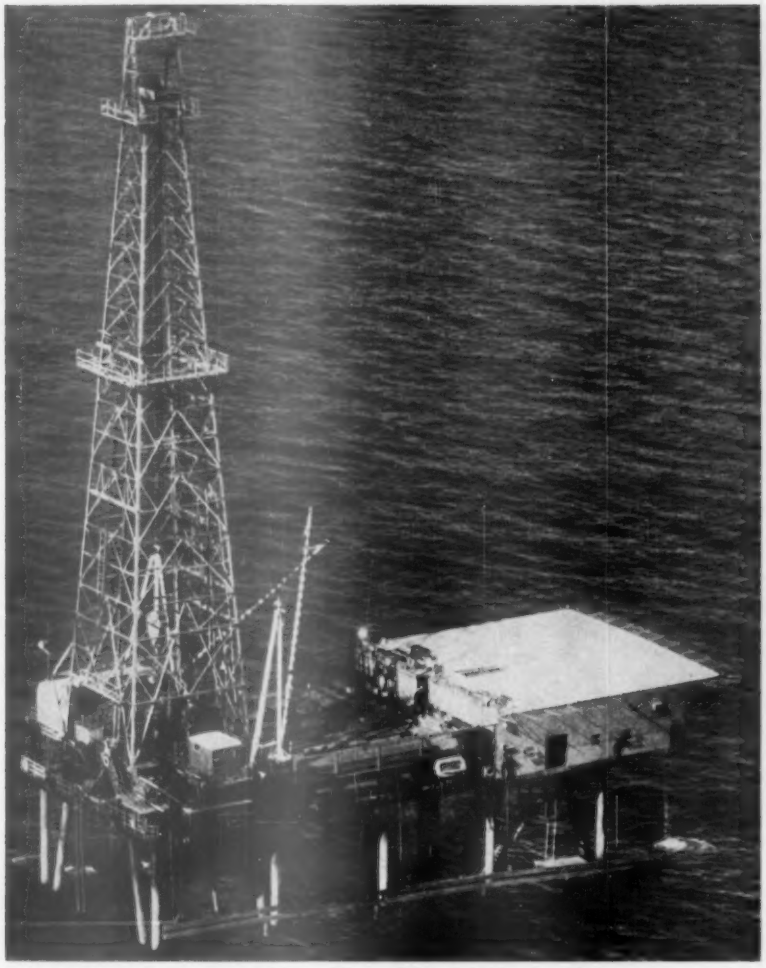
constant research

modern machining

Smith TOOL CO.

A Division of **SMITH INDUSTRIES** *International Inc.*

COMPTON, CALIFORNIA



AERIAL SHOT of S-45 rig working offshore from Fort Meyers, Fla.

Another "first" may pave way for more offshore drilling

A WELL THAT MADE NEWS recently was an offshore venture in Southwest Florida.

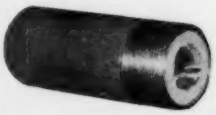
Why? No particular drilling problems were encountered, a vast new petroleum reserve didn't turn up, and no records were set for depth or rate of penetration. Further, no unusual techniques were reported—in fact the well was abandoned as dry at 14,000 ft.—yet the operation was a drilling "first."

The test was the California Co.-Coastal Petroleum Co. 1 Florida State Lease 224-B, located in township 44s-20e in the Boca Grande area, 4 miles offshore in open water from Charlotte Harbor, Lee County. Other offshore tests have been in the southern tip of the state in the Florida Bay and Marquesas Keys areas. Unsuccessful attempts also were made nearshore in waters along the straits of northwestern Florida.

The hole was drilled tight and just before moving off the site it was learned that cores taken at an interval near 12,236 ft. found "nothing promising at all." If production had been found, this would be Florida's first offshore strike.

The wildcat was the first test in the disputed offshore waters follow-

production and maintenance problems solved with Inhibited Acid



BEFORE CLEANING

AFTER CLEANING

Dowell inhibited hydrochloric acid is an efficient, economical solvent and cleaning solution. It is low in cost when its cleaning capacity is considered. One hundred gallons of 15 per cent hydrochloric acid will dissolve up to 184 pounds (one cubic foot) of pure limestone or calcium carbonate. It is ideally-suited to do-it-yourself operations.

Dowell hydrochloric acid has many uses. Some of them are: to improve production from old dolomitic or limestone wells; to remove scale and "gyp" from the face of producing formations, tubing and lead lines; to clean disposal or input wells; and to descale engine cooling systems, heat exchangers, boilers, valves, fittings, nipples, etc.

Dowell inhibited hydrochloric acid is available in small or large quantities from any Dowell station. Ask a Dowell representative for application information.

PRODUCTS FOR THE OIL INDUSTRY

DOWELL

DIVISION OF THE DOW CHEMICAL COMPANY

moment of truth

Nothing spells out the truth about a formation straighter than *Core Analysis.*

And while other exploration services end on the derrick floor, the utility of *Core Analysis* goes on and on. Long after you have applied this *direct* down-hole information to immediate drilling, testing, and completion decisions, you'll find its availability a virtual windfall through development, financing, and optimum depletion practices.

The use of *Core Analysis* is not a luxury. The absence of it is.

CORE LAB

CORE LABORATORIES, INC.

BOX 10185 DALLAS 7 TEXAS USA · CABLE ADDRESS CORELAB

UNITED STATES CANADA SOUTH AMERICA EUROPE AFRICA

ing the Supreme Court decision in the submerged lands case. It is quite likely that other tests will follow resulting from the federal ruling which allows the state to grant tideland leases to a distance of 3 leagues (10½ miles) in the Gulf Coast portion of Florida.

Firms merge

ONE GOOD ASPECT of prevailing merger fever in American business today is the increased efficiency in operation it often provides.

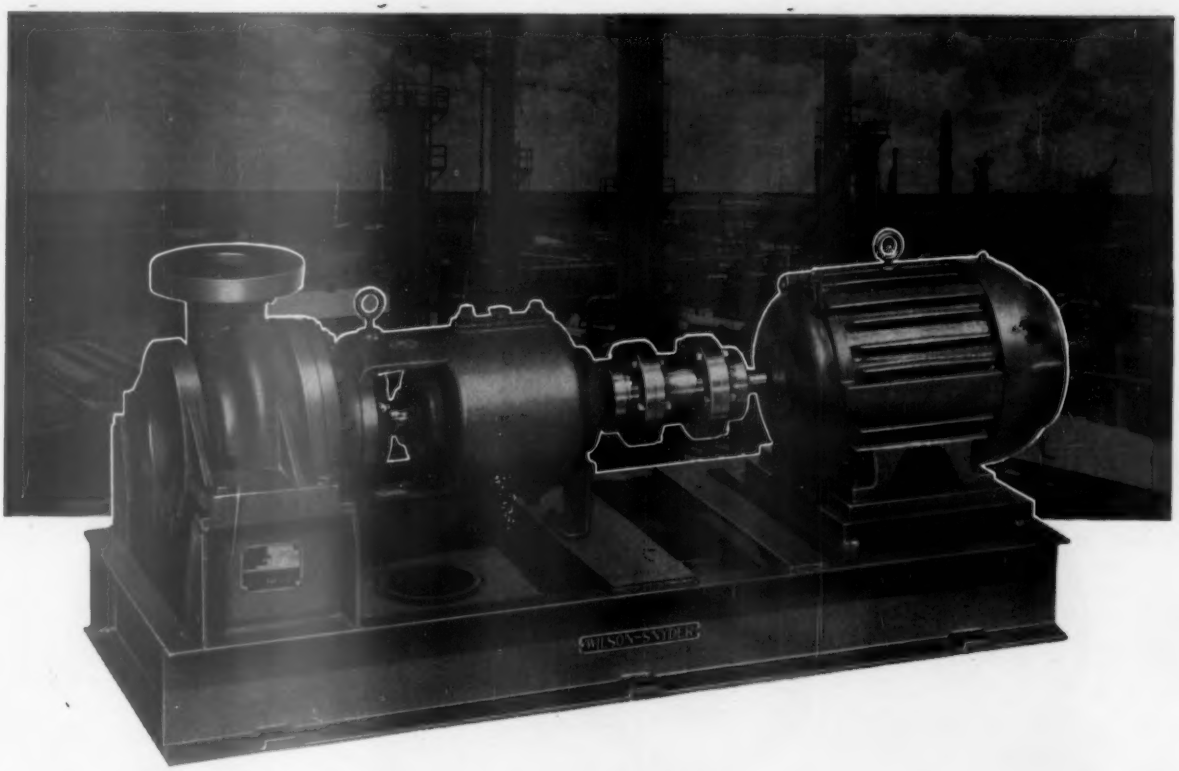
It has been announced jointly by the officials of Delta Drilling Co., Tyler, Tex., and Exploration Drilling Co., Tulsa, that Delta will acquire Exploration's seven drilling rigs operating in Colorado, Utah, Wyoming, and North Dakota. Added to the 80 rigs Delta already has, the additional equipment will make this one of the largest drilling firms in the world.

The spokesmen were Joe Zappa, Delta president, and Robert W. Berry, president of Exploration, who stated that essentially all drilling personnel of Exploration will continue to be employed in a similar capacity.

Delta has offices in Dallas, Houston, Kilgore, and Odessa, Tex.; Denver, Colo.; New Orleans, Lafayette and Lake Charles, La.; Casper, Wyo.; Pittsburgh and Indiana, Pa. For overseas operations, Delta offices are located in Madrid, Adelaide, Australia; Rome, Mexico City and Tampico, Mex.; Maracaibo, Caracas, and Buenos Aires.

Exploration Drilling will continue to operate as a corporation but will concentrate its efforts on oil and gas production. Offices will continue in Tulsa and Denver, with headquarters at 607 National Bank of Tulsa Building. William H. Carpenter will proceed as land manager and Ross E. Wells maintains his present capacity as exploration manager at the Denver office at 760 Petroleum Club Building.

Since 1944, Exploration has been a drilling contractor having operated rigs in Texas, New Mexico, Oklahoma, Kansas, Illinois, Indiana, Kentucky, Wyoming, Colorado, Montana, North and South Dakota, Utah, Nebraska, and in Mexico. It has producing properties in Colorado, Oklahoma, Nebraska, North Dakota, Texas, and Wyoming.



Wilson-Snyder announces a new line of heavy-duty Centrifugal Process Pumps—Type ESN

for maximum efficiency, dependability and economy

This all-new Wilson-Snyder Type ESN pump meets all and exceeds many of the requirements of A.P.I. Specifications and incorporates the following outstanding features:

- Double volute case design, for maximum radial balance at all load conditions in all sizes starting with 3" discharge and larger.
- Superior shaft design, with double row radial and double row angular contact type thrust bearings.
- Impeller designed for lowest possible NPSH without sacrifice of efficiency.
- Large effective cooling passages integral with stuffing box and bearing housing are designed for temperature applications up to 900 degrees F.

High-strength shaft design combined with double volute case design reduces shaft deflection to absolute minimum and allows widest possible range of operation. The double row ball radial and thrust bearings have been selected to assure long-life performance and lowest maintenance cost. Ring-oiled bearing lubrication with a large built-in oil reservoir provides positive and ample lubrication to all bearings. Stuffing boxes are designed for maximum packing standardization and all standard makes of mechanical seals can be applied interchangeably.

ESN pumps are available in a complete range of sizes, both single and 2-stage—end suction standard, top suction optional, on all single-stage pumps. Only five bearing bracket assemblies cover the complete line for horsepower applications up to 350. ESN pumps can be furnished in a wide range of metallurgy, including alloys suitable for highly corrosive and abrasive liquids.

Wilson-Snyder sales engineers

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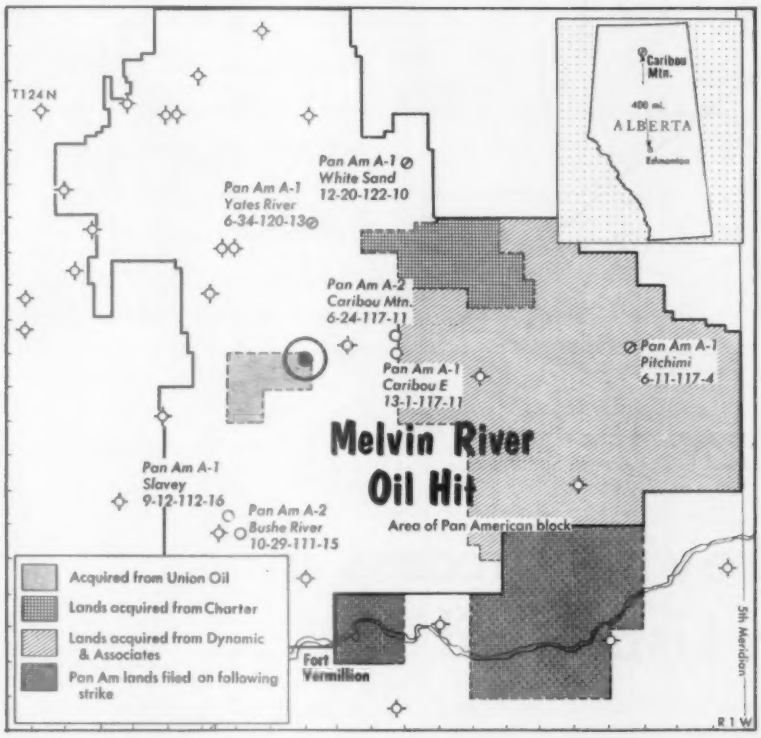


DISCOVERY OF OIL on Pan American Petroleum Corp.'s 5½-million-acre Caribou Mountain block set off a land play that saw 2 million acres snapped up in less than a week's time. The apparent success was scored at Pan American's A-1 Melvin River 16-32 wildcat.

Alberta's northern push opens new oil frontier

BY FRANK J. GARDNER

WESTERN CANADIAN oil horizons were broadened immeasurably last week when Pan American Petroleum Corp. discovered oil on its vast Caribou Mountain block in northern Alberta.

A new dimension . . . This Devonian-Slave Point strike pushes the oil front nearly 200 miles farther north. It lies only 65 miles south of the Northwest Territories, 400 miles north-northwest of Edmonton, 170 miles north of Red Earth (previously Alberta's northernmost oil field), and 100 miles northwest of the Athabasca oil sands.

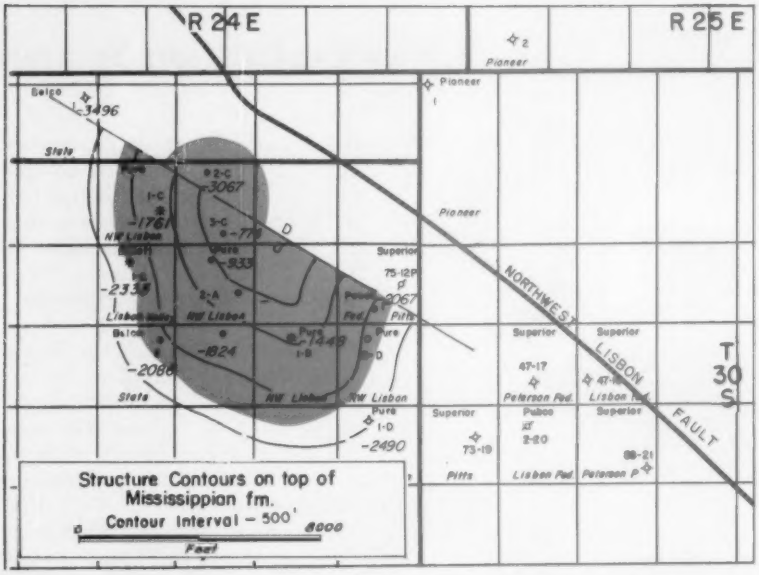
This discovery lies near the center of the largest single block of acreage in Alberta. Pan American now controls more than 5½ million acres, including acquisitions made since the discovery. Within a few days of the initial success, more than 2 million acres was filed on by Pan American, Imperial Oil Ltd., Baramy Investments, Ltd., Shell Oil Co. of Canada, Ltd., and Charter Oil Co., Ltd.

The trigger for the play was Pan American's A-1 Melvin River 16-32, lying on LSD 16-32-116-13w5. On drill-stem test of the Slave Point at 3,809-57 ft.. recovery was 90 ft. of mud, 180 ft. of gas-and-oil-cut mud,120 ft. of mud-cut oil, and 60 ft. of clean oil. The location falls in the northeast corner of a tract farmed out to Pan American by Union Oil Co. of California; Union retains a 10% net carried interest.

In an active region . . . The Melvin River well is one of 12 to 14 tests Pan American had programed for its big block this season. The company has drilled several failures, some of which had good Devonian porosities and showings of oil. Currently, three rigs are whirling at other locations north and east of the discovery, and four new locations are awaiting the drill (see map). Two of the locations lie to the east of the Melvin River strike, and two are far to the southwest of it, just east and northeast of an earlier failure that had free oil in noncommercial amounts. The three drillers are presently at the testing and coring stage, and the outcome of these should be apparent very soon.

The discovery well, meanwhile, is running production casing after drilling to total depth in the Muskeg-Devonian section. The successful drill-stem test covered the top 45 ft. of the Slave Point; another 60-ft. section below that was cored and tested, but recovery was salt water and mud. After casing is set, Pan American will begin production tests at the well.

Could change the map . . . If this new discovery is a flush one, Pan American will have forged a new link in a chain of important Slave Point fields that have dotted the Alberta landscape in the past 3 years. Climax of the Slave Point search, of course, was the discovery of the Swan Hills-Virginia Hills-Judy Creek complex nearly 300 miles due south; that billion-barrel reserve, at the time of its discovery, was nearly as remote as Caribou Mountain is today. Nobody knows what kind of reservoir has been tapped at Pan American's discovery, but should it be as rich as Swan Hills, the entire northern third of Alberta will resound with new seismic and drilling effort.



UTAH shows fine prospects of finding more oil like the thick prolific pays uncovered at its Lisbon field. Fig. 1.

BY HARRELL BUDD
Consulting Geologist
Farmington, N. M.

Seismic-subsurface exploration programs paved the way for pin-pointing the drill site in Lisbon field. Similar joint projects are likely to result in more fine fields for Rocky Mountain operators.

Teamwork is key to success in tracking down Lisbon oil

ALTHOUGH Utah's Lisbon has abundant outcrops, little covering soil or vegetation, extensive deformation, and complex depositional and structural history most drillers considered it poor pickings until Pure Oil Co. spudded its 1 Northwest Lisbon 18 months ago.

Pure located 1 Northwest Lisbon—now 1 U.S.A.—in 10-30s-24e, San Juan County, and turned up one of the major oil and gas discoveries in the Rocky Mountain area in recent years.

After the well's completion as a Mississippian and Devonian discovery on January 5, 1960, the attention of the oil and gas industry focused on the structural province of the salt folds in the center portion of the Paradox embayment, a region many have heretofore considered a poor prospect for oil and gas exploration.

Because of the low B.t.u. content of Mississippian gas, the high pour point of the oil, and the disappointing production history of Mississippian reservoirs, exploratory drilling below rocks of Pennsylvanian age in the Paradox embayment had been limited to a courageous few. Pure has been understandably reticent about releasing all the geologic information gained from drilling this dscovery well. This article will summarize briefly the information now available.

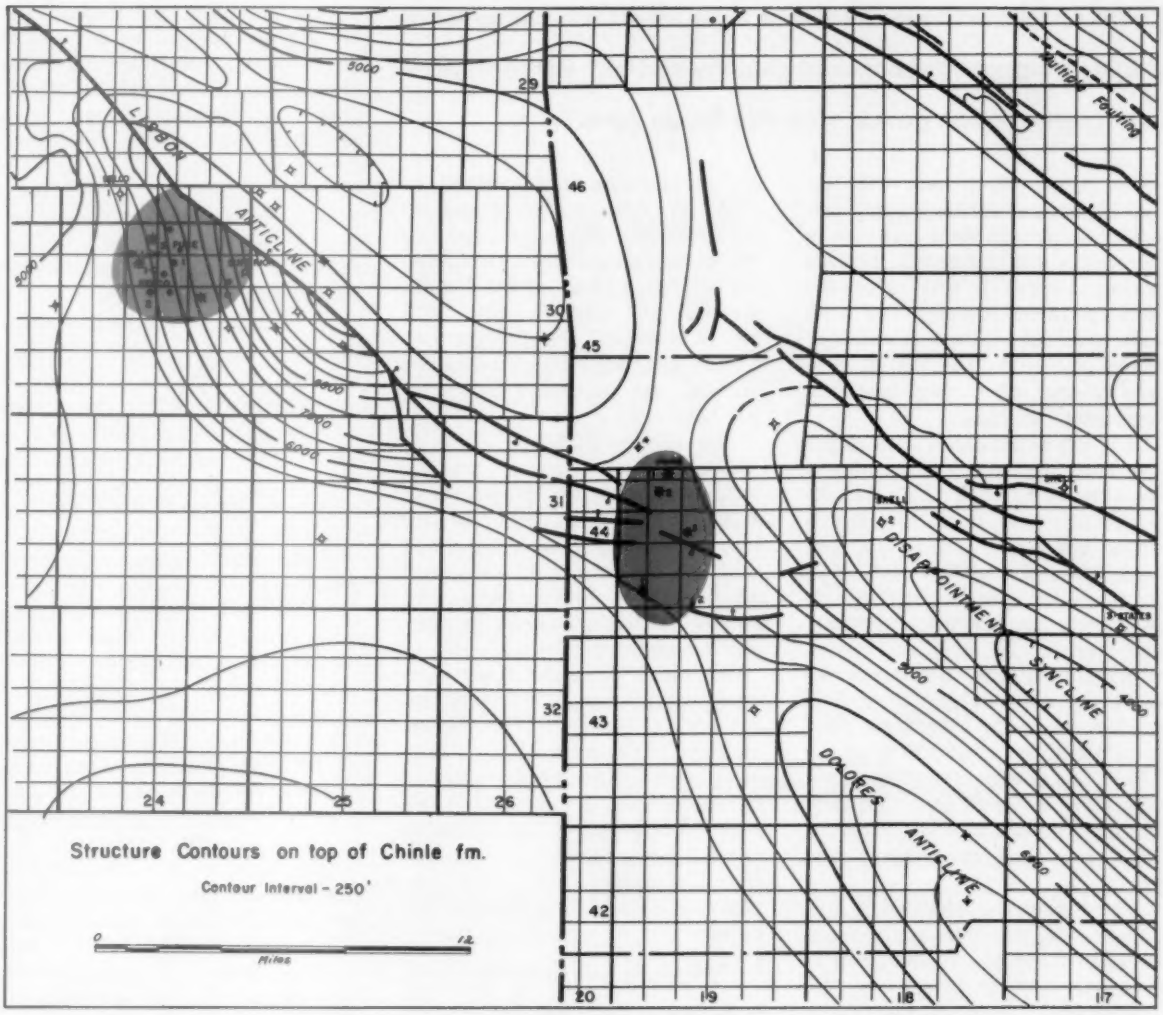
Structure. The Lisbon Valley-Dolores anticline is one of the five major salt folds of the Paradox basin. Northwest Lisbon appears as a faulted anticline on the south flank of the northwest end of the Lisbon Valley-Dolores trend. The crest of the anticline is a graben with normal faulting on the south flank. Lisbon field is located on the upthrown side of the south fault and has approximately 3,000 ft. of closure at the surface (Fig. 1).

These salt anticlines and associated structures had their inception soon after the salt deposition in Pennsylvanian times and have undergone intermittent growth ever since. Thus, the structure of the postsalt beds effectively masks the attitude of the older presalt rocks. In all probability, salt deposition and later movement was affected by presalt structural and topographic highs. Consequently there undoubtedly exists a relationship between the Mississippian and older structures with the Pennsylvanian salt folds of the Paradox basin. What this relationship will prove to be can only be defined by the drill bit.

After an extensive subsurface and seismic exploration program, Pure located its 1 Northwest Lisbon on the west flank of Utah's Lisbon anticline, approximately 2,000 ft. below the surface crest of the structure. Pure has never stated the reason for this downdip location for such an important and expensive wildcat. Obviously, they thought it was the best structural position for pre-Pennsylvanian rocks. The writer can only surmise that this decision was based on detailed seismic reflection survey which probably incorporated salt isopach maps as a major tool.

Subsequent drilling has proved the wisdom of Pure's choice of location as indicated by the preliminary subsurface contour maps (Fig. 2). Based on the 12 wells drilled to date, the presalt structure varies considerably from the postsalt fold.

Fig. 2 is a structure contour map on top of the Mississippian taken from the 12 points available at the time of this writing. These 12 points are located on the crest or southwest flank of the Mississippian structure.



TWO-STATE TREND of Utah's Lisbon and Colorado's Southeast Lisbon field offers hope that other big producing structures will be found. In this region well density is comparatively low. Note the complex fault patterns. Fig. 2.

Stratigraphy

Listed below are the various formations and depths in the discovery well as released by Pure:

Formation—	Depth (ft.)
Triassic	Surface
Wingate	308
Chinle	937
Moenkopi	
Permian:	
Cutler	1,433
Pennsylvanian:	
Hermosa	2,268
Paradox:	
Upper	3,973
Salt	4,299
Lower	7,258
Molas	7,498
Mississippian	7,522
Devonian:	
Ouray	8,008
Elbert	8,086
McCracken	8,253
Cambrian	8,359
T.D.	8,440

There were some minor oil shows recorded in an oolitic limestone in the Hermosa formation; however, none were commercial. The primary objectives of this exploratory hole were the various rock units of the Mississippian and Devonian systems.

Coring operation began at 7,690 ft., 67 ft. into the top of the Leadville formation, of Mississippian age. Pure reported recoveries of interbedded limestone and dolomite in a ratio of 60% dolomite and 40% limestone. The dolomites were primarily crystalline, with intercrystalline and vugular porosity, bleeding condensate and gas from porosity and random fractures. The limestones were tan, crystalline to earthy, with some fossil hash. Porosity was reported in the limestones, but not to the extent of the dolomites.

Coring continued and at 7,684 ft. the limestones thinned and became inconsequential in the descriptions. Below this depth, probably at the top of the Madison formation, the lithology was primarily gray to tan crystalline dolomites with intercrystalline and vugular porosity and minor amounts of limestone, shale, and chert. As previously stated, all porous zones, intercrystalline, vuggy and fractured, were bleeding condensate and gas.

At a depth of 8,008 ft. the top of the Devonian, the Ouray limestone, was encountered in the cores. This was reported to be a tan to cream, dense, lithographic lime-

"Pure has shown how effective a team effort combining land, engineering, geophysics, and geology can be. Perhaps other operators . . . can gain a valuable lesson here."

stone in the upper part, with gas and condensate bleeding along random fractures. In the lower part of the Ouray the limestones became medium crystalline with associated intercrystalline porosity and with some thin beds (4 to 5 ft.) of crystalline dolomite. The porous portion of the entire core contained condensate and gas.

The top of the Elbert (still Upper Devonian age) was encountered in the core at 8,086 ft. This was reported as a gray, crystalline, arenaceous limestone with a few thin shale beds. Twenty-five feet below the top of the Elbert some thin beds of gray to tan crystalline dolomite and green shales were interbedded with the limestones. Grading downward, the dolomite and shale beds thicken while the limestones thin. As a result, the basal 130 ft. of the Elbert was described as gray to tan crystalline dolomite with thin beds of gray to green shale. All porous intervals contain shows of oil and gas.

The top of the McCracken formation was recorded in the cores at 8,259 ft. (8,253 ft. on the electric log). This formation was described as 35 ft. of brown, fine to coarse-grained, poorly sorted, glauconitic, friable dolomite sandstone with good oil stain and odor, 15 ft. of sandy dolomite with good stain and cut, 7 ft. of sandstone described as above, 1 ft. of sandy, crystalline dolomite, 16 ft. of sandstone and 25 ft. of laminated sandy dolomite and dolomitic shale.

The top of the Cambrian was reported at 8,329 ft. in the core and at 8,359 ft. on the logs. It was described as a dark gray crystalline, argillaceous dolomite with thin beds of shale.

The well bottomed at 8,440 ft., 81 ft. into the Lynch dolomite of Cambrian age.

Completion. Seven-inch casing was set at 8,440 ft. The McCracken was perforated from 8,261 to 8,293 ft. and 8,310 to 8,348 ft. On natural gage it swabbed 10 bbl. of oil per hour. Well was treated with 50 gal. of high-flow and 150 bbl. of crude oil. After treatment and recovery of load oil, well flowed 130 bbl. of new oil per day. After flowing and being swabbed for 7 days, the well was acidized with 2,000 gal. of mud acid and flushed with 55 bbl. of crude. After recovery of load oil, well swabbed 2 bbl. of oil per hour.

The interval 8,293 to 8,310 ft. was perforated with two jets per foot and the entire interval from 8,261 to 8,348 ft. was sand-oil fracture treated. After recovery of load oil, the well was potentialed on January 5, 1960, flowing 586 bbl. of oil per day with no discernible amounts of water.

To date, 12 wells have been drilled on or near the Mississippian structure at Lisbon field as shown on Fig. 2. Of these, 9 have been completed, 6 Mississippian gas and oil wells and 3 McCracken oil wells. There have been two holes plugged and abandoned and one (Pure 2-C) plugged back and completed as a small Pennsylvanian discovery.

Summary and Conclusions

Although Pure has not released any of the results of the core analysis, it is possible to arrive at some interesting conclusions based on the released core descriptions and drill-stem tests.

Pure discovered the gas-condensate reservoir in Mississippian limestones and dolomites on Northwest Lisbon structure. Elliott Oil Co. encountered the oil-water contact in its well on the southwest flank. The top of the Mississippian was encountered at +774 ft. subsea datum in the structurally highest well to date. Elliott encountered the oil-water contact at −2,525 ft. A simple calculation leads to the conclusions that there is a gross 1,751-ft. gas-oil column in the Mississippian-Devonian reservoir on this structure. The structure probably has a gas-condensate cap with a 49° oil ring around the flanks. The core descriptions indicate a net section of approximately 330 ft. of porous, fractured carbonates capable of producing gas and condensate from the Mississippian in the discovery well. Elsewhere the Mississippian carbonates average 10% porosity with 3-md. permeability. The writer sees no reason why these figures could not be applied here, as the Mississippian is generally considered as a blanket type of reservoir with fairly consistent porosities and permeabilities.

In addition to the Mississippian discovery, and perhaps overshadowed by it, was the discovery of an oil reservoir in the McCracken sandstone, of Upper Devonian age. This appears to be a separate accumulation from the overlying Mississippian gas-condensate and oil reservoir. In the McCracken, Pure reported 82 ft. gross oil column with 66 ft. of net sand. The McCracken, as the Mississippian, was fairly tight, possibly averaging 9% porosity; it too was fractured, however, effectively increasing the permeability. Sandstones of the McCracken formation have varied considerably in thickness, grain size, porosity, permeability and per cent dolomitic matrix, suggesting more stratigraphic influence in the Devonian than in the Mississippian reservoir on Lisbon field. The oil-water contact, if one exists, has not been penetrated in the McCracken reservoir. The producing mechanism or drive is unknown; however, the low gas-oil ratios are suggestive of water drive rather than solution gas drive energy.

In summary, despite low porosities and permeabilities, the thick, fractured pay sections and high reservoir pressures result in a favorable reserve picture. The discovery of these two reservoirs was the most significant feature of exploratory drilling in the southern Rocky Mountain area and perhaps in the nation in 1959.

Pure has shown how effective a team effort combining land, engineering, geophysics, and geology can be. Perhaps other operators, both major companies and independents, can gain a valuable lesson here. When major oil reserves become hard to find, this is not the time to reduce the professional staff, but rather a time to encourage imaginative thinking with full use of all exploration departments.

CORRECTION

J. W. Dean

R. E. Lauth

In last week's issue of the Journal, the authors' pictures in the article on Helium in the Four Corners area (p. 194) were inadvertently reversed. They should have appeared as shown above.

Texas dry hole becomes gas producer

A dry hole drilled in 1937 has been converted into a good gas producer and a discovery well opening a new field 15 miles southwest of Hebbronville, in northwestern Jim Hogg County, South Texas.

The gas flow, calculated good for 31,800 M.c.f.d. on open flow, is from a sand perforated at 3,052-60 ft. Hole had been drilled to 4,300 ft. Rio Grande Vally Gas Co., present operator, cleaned out and ran a string of 2⅞-in. casing to 3,220 ft.

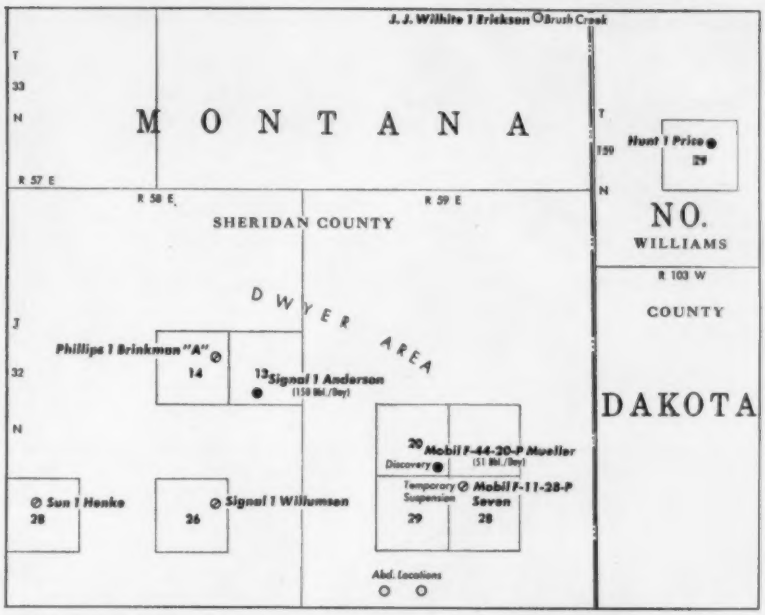
Actual flow tests ranged from 984 M.c.f.d. of gas through 3/16-in. choke to 3,462 M.c.f.d. through ⅜-in. choke.

The new well, 4 Yeager Armstrong, is west of San Pablo field.

San Juan may see new depth record

A new depth record may be in store for northern New Mexico's San Juan basin. El Paso Natural Gas Co. will drill to 16,000 ft. and Cambrian at a wildcat in SE 7-29n-5w, Rio Arriba County.

Location for the proposal deep test is on the east side of the basin. It will be the first well to go deeper than Cretaceous rocks in this section of the state. Present depth record for this part of New Mexico is Pan American Petroleum Co.'s Ute Indian-B in SE NW 17-33n-7w, La Plata County, Colorado. This well went to 13,127 ft. in 1956, 15 miles northwest of the new location. Pan Am's wildcat went to Precambrian. Some shows of gas were reported from Paradox Pennsylvanian, but no tests were made.



THIS CLOSEUP VIEW of Montana's Dwyer area shows the current pickup in drilling activity here following the 1960 discovery.

Montana-North Dakota border area keeps busy

MONTANA'S DWYER AREA is undergoing important wildcat and development work on both sides of the state line.

In North Dakota's Williams County, Hunt Oil Co. 1 Price, C SW NE 29-159n-103w, flowed 9 bbl. of oil per hour during tests. The tests were of the same Madison Mississippian zone as that at Dwyer field, 5 miles southwest in Sheridan County, Montana.

In Montana, Phillips Petroleum Co. is testing perforations at 7,730-66 ft. at the north offset in Charles Mississippian at the 1 Brinkman-A in C SE NE 14-32n-58e. One and a half miles south of Dwyer, Signal Drilling & Exploration Co. is waiting on completion tools at 1 Willumsen in SE NE 26-32n-58e, an apparent discovery. Sun Oil Co. is drilling below 7,200 ft. at 1 Henke, 2½ miles southwest of the field in C SE NW 28-32n-58e. This well will drill to 8,000 ft. or Charles.

Dwyer field was opened last year at Mobil F-44-20-P Mueller. That well flowed 51 bbl. of oil daily from Madison Mississippian. Later, Signal got 150 bbl. of oil daily from the Madison at 1 Anderson, extending the field northwest. Success has been slow in this central, deep portion of Williston basin. Nearest production is far to the east on the Nesson anticline, to the northwest at Outlook, to the west at Bredette, and southwest to Brorson. Successful completion of current wells in the area would do much toward bringing Williston back into the drilling arena.

Louisiana discovery being confirmed

A discovery by Shell Oil Co. last November 1½ miles south of its Chauvin field, southeast of Houma, in Terrebonne Parish, southeastern Louisiana, is being confirmed by the new area's second well.

The confirming well, 1-A. F. Hebert, 2,030 ft. from the discovery producer, flowed at the rate of 240 bbl. of 48°-gravity oil with 5,897 M.c.f.d. of gas while testing through 13/64-in. choke. Flowing pressure was 1,075 psi.

Production is from perforated interval at 13,651-75 ft. Shell's discovery well, 1 Mable Hebert, flowed 170 bbl. with 4,760 M.c.f.d. of gas through 10/64-in. choke with pay perforated at 13,587-628 ft.

New find reported for British Columbia

Sinclair Canada Oil Co. and others have a new gas discovery at No. d-10-G Beg, wildcat in the South Alcan area and east of the Alaska highway in British Columbia, Canada.

The discovery well, 10 miles east of the town of Beaton River on the Alaska highway, was dually completed in two sections of the Triassic.

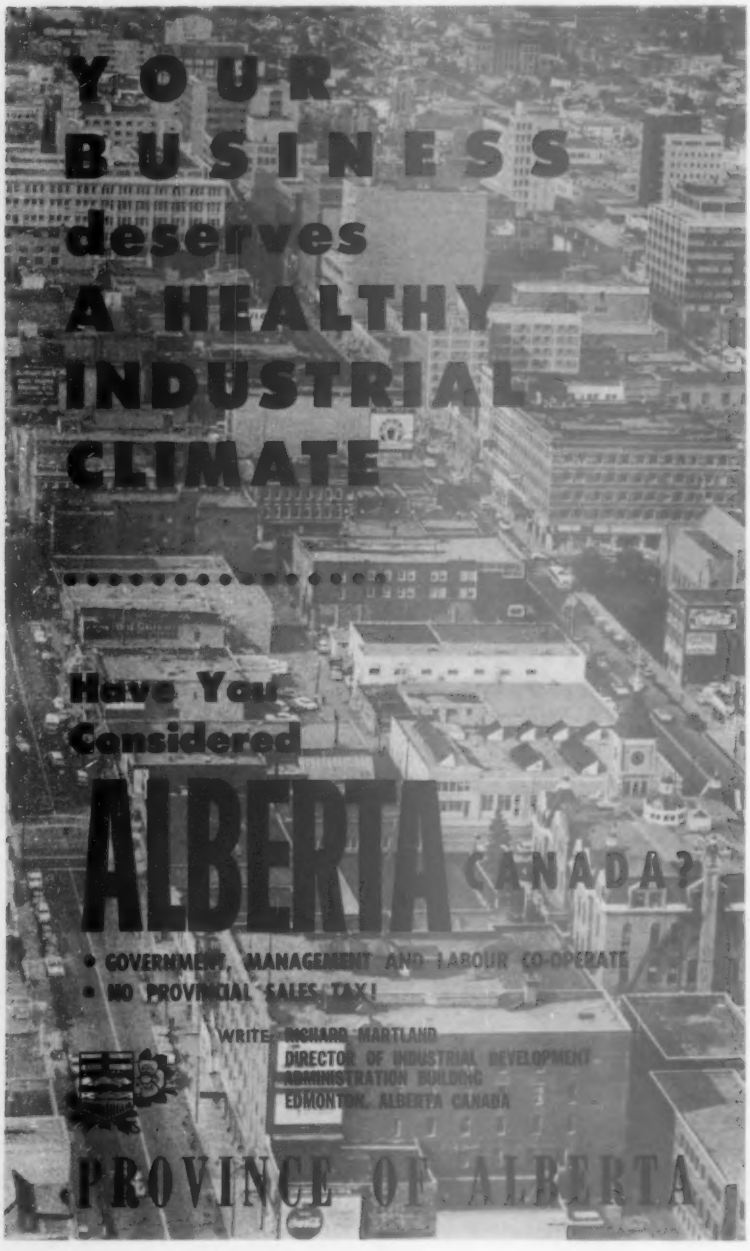
The well yielded 3,900 M.c.f.d. of gas on absolute open flow test of "A" zone perforations at 7,726-54 and 4,761-83 ft.; and made 10,900 M.c.f.d. from "D" zone perforations at 5,452 - 88, 5,492 - 5,507, and 5,513 - 36 ft.

First Swan Hills success for Pure

In Alberta, Pure Oil Co. has completed its first well in Swan Hills field, about 120 miles northwest of Edmonton.

The well flowed 265 bbl. of oil through a ½-in. choke in 6½ hours. Production is from a reef limestone at around 8,700 ft.

A second well on Pure's 640-acre tract is nearing completion.



Deep well drilling in eastern Kentucky

In Eastern Kentucky's Elliott County, the proposed deep wildcat, United Fuel Gas 1 Ada Pennington, was drilling at 420 ft. Well is located in 21-T-77, 1,750 ft. FEL and 5,325 ft. FSL. Test will explore part of the Cambro-Ordovician formations.

New Michigan pool prospect is tested

C. W. Collin and Lanphar Oil Co. are testing their third new pool prospect this year in eastern Michigan. Their 1 Kaufman, SW SW SW 24-4n-15e, Casco Township, St. Clair County, logged Niagara reef at 2,593 and at 2,609 ft. carried 200 ft. oil in 10 hours. Wildcat is located 1 mile east of the Peters reef.

A week ago J. O. Mutch 1 Nyland, NE SW NE 34-3n-13e, Macomb County, completed on plugback from 4,695 to 2,853 ft., followed by acid and sand fracture, for 35 to 45 bbl. oil per day with 3 M.M.c.f. gas. Production is from the Niagaran reef.

Hartman and McClure completed a gas discovery earlier in the year in 15-4n-16e, China township, St. Clair County.

Pennsylvania well being tested

In Pennsylvania, Phillips Petroleum Co.'s wildcat on Tract 26A1, Greenfield Township, Blair County, had an open flow after fracture of 1,300 M.c.f.d. with rock pressure at 2,940 psi. in 24 hours. The well was drilled 6 ft. into the Helderburg. Phillips announced a new location. It will be the No. 2 well on Tract 26, about 4,000 ft. northeast of the Blair discovery. Rig is being rigged up at this spot.

Fayette County. Earl Rahl, a discovery in Wharton Township, was drilled by Snee & Eberly-Peoples Natural Gas Co. This wildcat was

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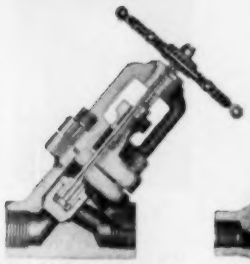

General Purpose Globe Valve
Fig. 848, Bolted Bonnet
2000 lb WOG
600 lb at 910F
(Sizes ¼" to 1")

High Pressure Globe Valve
Fig. 158, Screwed Bonnet
10,000 lb WOG
(Sizes ¼" to 2")

Fig. 848 features new spiral wound gasket, new solid disk of chrome-cobalt-tungsten alloy, integral Stellite seat, forged steel body and bonnet, exclusive EValloy 13% chromium stainless steel stem, and new swing-style stainless steel gland bolts. Also available in angle design. Fig. 158 features EValized bonnet to resist corrosion and abrasion, and protect stem threads; replaceable screwed-in seat and swivel needle disk of EValloy 13% chromium stainless steel, Impactor* handle, Buna-N "O" rings for leakproof joints. Both valve types are available in choice of screwed or socket welding ends.

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drilled on a different fault block east of South Summit pool. It found gas in the Onondaga chert and salt water in the Oriskany. After being plugged back to 7,700 ft., the well was fractured in the chert. After fracture, the well made 381 M.c f.d. and rock pressure of 2,775 psi. in 97 hours. This opens East Summit pool.

Washington County. Gulf Oil Corp. and John Galey's Aaron F. Conner wildcat in North Bethlehem Township was dry after finding a small show of gas in the chert at 7,505 ft., 7,574, and 7,690 ft. The Oriskany was dry, but small gas was found in the Salina at 8,042 ft. The well is plugged and abandoned at total depth of 8,125 ft.

Helvetia pool. Of the three recent field wells completed in the Clearfield County area, one was finaled in Helvetia pool, in Punxsutawney-Driftwood field, and one in Ole Bull pool, Leidy field, and a confirmation well in Burgess field, Erie County.

Wildcats to watch. There are two interesting wildcats in Warren County. One is the Bierg et al. 2 F. Kapp. Operator is running 7-in. at 5,527 ft. after finding Oriskany dry at 4,371-84 ft. Target of this wildcat is the Medina. The second wildcat is Paul Benedum's well in Warren County's Limestone Township. It found the Medina at 5,820 ft. and gas at 5,925 ft. A section of the Medina was cored at 5,826 ft. Drilling is now at 5,965 ft.

Map of Williston basin revised, updated

Northwest Mapping Co. in Bismarck has available a completely updated map of the entire Williston basin. This three-color map is priced at $25. It covers North Dakota, East Montana, South Dakota, and southern Canada. Scale is large, details easy to read, wells easy to locate. Order from Northwest Mapping Co., 117½ Fourth Street, Bismarck.

New Mexico well taps Pennsylvania pay

Lea County in Southeast New Mexico has a new Pennsylvanian oil discovery well at Aztec Oil & Gas Co. 1 Northeast Maljamar unit, 4 miles northeast of Maljamar townsite in 5-17s-33e.

The well flowed 210 bbl. of oil daily through 28/64-in. choke on potential test. Perforations are at 10,858-98 ft. Location is 1 mile north of Roberts field.

Montana adds Tule Creek producer

A Tule Creek producer is reported in Roosevelt County, Montana. Murphy Corp. completed 2 Sletvold in C SE NE 18-30n-48e, pumping 145 bbl. of oil and 356 bbl. of water per day from Nisku Devonian perforations at 7,684-88 ft.

This new producer is the north offset to the field discovery well at 1 Sletvold in C SE SE 18-30n-48e. It flowed 476 bbl. per day from Nisku at 7,660-92 ft.

Wells on the east and southwest of the discovery have been abandoned. Location was staked for an 80-acre southeast offset. It will be the 1-B Sethrie in C NW NW 20-30n-48e. Depth will be 7,750 ft. or Nisku. Murphy is drilling below 7,100 ft. at 2 Zimmerman in C NW

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January completions totaled 3,996 in U. S.

	ALL WELLS									WILDCATS					
	Total	Oil	Cond.	Gas	Dry	Service	Footage	C.T.	D.D.	Total	Oil	Cond.	Gas	Dry	Footage
Alabama	6	4	0	0	2	0	68,365	0	0	2	0	0	0	2	22,815
Alaska	1	1	0	0	0	0	10,830	0	0	0	0	0	0	0	0
Arizona	2	0	0	0	2	0	2,452	0	0	1	0	0	0	1	1,182
Arkansas	39	9	0	4	25	1	166,724	0	0	13	0	0	1	12	54,904
California	173	117	0	13	38	5	683,404	0	11	20	1	0	1	18	118,147
Colorado	63	12	0	8	43	0	297,943	3	4	38	1	0	2	35	174,524
Florida	2	0	0	0	2	0	25,646	0	0	2	0	0	0	2	25,646
Georgia	1	0	0	0	1	0	4,500	0	0	1	0	0	0	1	4,500
Illinois	176	67	0	1	59	49	349,241	40	9	36	2	0	1	33	59,425
Indiana	77	30	0	0	46	1	117,245	31	3	14	2	0	0	12	15,484
Kansas	443	225	0	38	143	37	1,061,857	126	0	83	10	0	6	67	335,255
Kentucky	128	27	0	18	82	1	192,084	65	2	13	0	0	1	12	18,603
Louisiana	386	194	18	33	141	0	3,133,740	0	1	52	6	2	2	42	491,583
North	126	48	1	21	56	0	460,949	0	0	22	3	0	1	18	129,944
South	198	107	10	7	74	0	2,002,655	0	1	28	3	2	1	22	339,130
Offshore	62	39	7	5	11	0	670,136	0	0	2	0	0	0	2	22,509
Michigan	74	18	0	2	54	0	241,987	38	0	37	0	0	0	37	118,909
Mississippi	61	19	3	1	38	0	602,375	0	0	23	0	0	0	23	227,319
Missouri	5	0	0	0	5	0	8,501	4	0	4	0	0	0	4	7,107
Montana	35	9	0	2	24	0	150,306	4	1	16	1	0	0	15	65,858
Nebraska	52	12	0	0	40	0	265,406	0	2	27	0	0	0	27	130,404
Nevada	7	0	0	0	7	0	9,595	0	0	7	0	0	0	7	9,595
New Mexico	135	70	0	30	35	0	729,824	36	1	19	4	0	0	15	112,080
West	64	19	0	29	16	0	342,285	16	1	10	1	0	0	9	37,222
East	71	51	0	1	19	0	387,539	20	0	9	3	0	0	6	74,858
New York	32	15	0	2	4	11	47,807	30	0	2	0	0	0	2	5,590
North Dakota	18	11	0	0	7	0	102,199	0	0	3	0	0	0	3	20,872
Ohio	78	41	0	13	21	3	193,659	76	0	5	0	0	0	5	16,116
Oklahoma	361	149	5	33	119	55	1,280,021	85	0	55	13	0	2	40	272,663
Pennsylvania	110	35	0	42	14	19	362,346	99	16	9	0	0	4	5	64,343
South Dakota	2	0	0	0	2	0	8,924	0	0	2	0	0	0	2	8,924
Tennessee	12	4	0	0	8	0	4,598	12	0	12	4	0	0	8	4,598
Texas	1,322	627	109	80	474	32	6,166,423	53	1	305	23	13	9	260	1,534,010
District 1	77	28	1	3	39	6	237,202	0	1	30	0	0	1	29	121,217
District 2	83	9	26	22	24	2	564,244	0	2	14	0	3	2	9	101,538
District 3	112	38	20	6	48	0	858,422	0	0	29	5	1	1	22	272,869
District 4	149	54	27	16	52	0	912,043	0	4	40	4	5	2	29	226,884
East (5 & 6)	111	56	8	0	44	3	557,987	0	0	28	0	0	0	28	142,207
District 7-B	169	72	2	6	87	2	530,102	18	0	49	3	1	0	45	189,286
West (7-C & 8)	293	181	12	3	87	10	1,472,073	14	0	66	5	1	1	59	301,806
District 9	202	104	7	2	82	7	511,544	21	0	38	3	0	1	34	97,562
District 10	126	85	6	22	11	2	522,806	0	1	11	3	2	1	5	80,641
Utah	16	3	0	1	12	0	93,185	0	0	13	1	0	0	12	76,621
Washington	1	0	0	0	1	0	2,625	0	0	1	0	0	0	1	2,625
West Virginia	83	14	0	62	6	1	201,407	79	0	0	0	0	0	0	0
Wisconsin	6	0	0	0	6	0	8,100	0	0	6	0	0	0	6	8,100
Wyoming	89	32	0	6	51	0	425,885	6	1	36	1	0	1	34	168,293
Total Jan. 1961	**3,996**	**1,745**	**135**	**389**	**1,512**	**215**	**17,019,206**	**787**	**59**	**857**	**69**	**15**	**30**	**743**	**4,176,095**
Total Jan. 1960	4,223	1,971	161	347	1,610	134	18,363,101	...	..	951	78	12	27	834	4,356,111
Total Dec. 1960	4,810	2,331	95	416	1,687	281	18,626,001	...	..	883	64	16	40	763	4,103,802

SW 17-30n-48e, an 80-acre northeast offset. Placid Oil Co. is shut down at a west offset to the field discovery, 1 Herting in C SE SW 18-30n-48e.

On the northwest side of the field, Humble and Phillips are below 7,140 ft. at 1 McKee in C NW SE 13-30n-47e. This is an 80-acre southeast offset to Placid Oil Co. 1 Lough in C SE NW 13-30n-47e.

New Permian basin region wall map now available

A new geological and field map of West Texas-Southeast New Mexico is now ready for purchasing from the Midland Map Co., Midland, Tex. This colored map plainly shows fields, counties, and geological features of the West Texas region. Prominently shown is the Delaware and Val Verde basins, regions of current exploratory excitement in this province.

Three new finds for West Texas

THREE DISCOVERIES featured West Texas exploratory news last week. New fields were opened in Dawson, Pecos, and Winkler counties.

In Dawson County, Forrest Exploration Corp. and Champlin Oil & Refining Co. finaled a Wolfcamp Permian reef discovery 5 miles northwest of Lamesa at 1 Durward Sshmidt. The well flowed 216 bbl. of 38.7°-gravity oil daily through ¼-in choke. Perforations are at 9,381-90 ft. Location is in Section 3, Block 2, D. L. Cunningham Survey, 1¼ miles southeast of East Mungerville-Pennsylvanian field.

Pecos County. Southern Minerals Corp. and General Crude Oil Co. 1-A Jasper CSL, 30 miles southeast of Fort Stockton, was completed flowing up to 7 M.M.c.f.d. and 143.5 bbl. condensate from Ellenburger Cambro-Ordovician open hole at 10,396-10,590 ft. Operators

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January footage breakdown

	FIELD WELLS					WILDCATS			
	Oil	Cond.	Gas	Dry	Service	Oil	Cond.	Gas	Dry
Alabama	45,550	.....	.....	.....	.....	.....	.....	.....	22,815
Alaska	10,830	.....	.....	.....	.....	.....	.....	.....	.....
Arizona	.....	.....	.....	1,270	.....	.....	.....	.....	1,182
Arkansas	32,178	.....	19,527	58,915	1,200	.....	.....	7,920	46,984
California	385,291	.....	67,991	104,854	7,121	3,045	.....	4,321	110,781
Colorado	47,241	.....	41,626	34,554	.....	6,177	.....	14,610	153,737
Florida	.....	.....	.....	.....	.....	.....	.....	.....	25,646
Georgia	.....	.....	.....	.....	.....	.....	.....	.....	4,500
Illinois	158,948	.....	.....	54,587	76,281	4,903	.....	1,010	53,512
Indiana	52,918	.....	.....	48,029	814	2,649	.....	.....	12,835
Kansas	397,679	.....	81,583	188,360	58,980	34,466	.....	30,943	269,846
Kentucky	36,848	.....	46,179	89,674	780	.....	.....	1,203	17,400
Louisiana	1,503,681	187,664	182,360	768,452	.....	58,428	29,652	13,808	389,695
North	95,355	9,578	55,205	170,867	.....	24,993	.....	2,235	102,716
South	996,629	101,792	73,205	491,899	.....	33,435	29,652	11,573	264,470
Offshore	411,697	76,294	53,950	105,686	.....	.....	.....	.....	22,509
Michigan	55,833	.....	5,528	61,717	.....	.....	.....	.....	118,909
Mississippi	208,559	32,850	11,231	122,416	.....	.....	.....	.....	227,319
Missouri	.....	.....	.....	1,394	.....	.....	.....	.....	7,107
Montana	38,944	.....	3,669	41,835	.....	2,525	.....	.....	63,333
Nebraska	63,282	.....	.....	71,720	.....	.....	.....	.....	130,404
Nevada	.....	.....	.....	.....	.....	.....	.....	.....	9,595
New Mexico	333,595	.....	190,823	93,326	.....	35,124	.....	.....	76,956
West	93,878	.....	181,688	29,497	.....	6,966	.....	.....	30,256
East	239,717	.....	9,135	63,829	.....	28,158	.....	.....	46,700
New York	19,875	.....	5,117	2,650	14,575	.....	.....	.....	5,590
North Dakota	61,152	.....	.....	20,175	.....	.....	.....	.....	20,872
Ohio	98,318	.....	37,535	37,605	4,085	.....	.....	.....	16,116
Oklahoma	420,281	39,058	181,524	254,287	112,208	79,346	.....	13,119	180,198
Pennsylvania	64,675	.....	165,272	32,076	35,980	.....	.....	24,356	39,987
South Dakota	.....	.....	.....	.....	.....	.....	.....	.....	8,924
Tennessee	.....	.....	.....	.....	.....	1,060	.....	.....	3,538
Texas	2,467,698	857,557	302,273	929,534	75,351	172,017	113,209	67,642	1,181,142
District 1	69,463	6,750	5,038	27,502	7,232	.....	.....	6,220	114,997
District 2	56,654	193,430	94,687	110,265	7,670	.....	31,016	9,749	60,773
District 3	192,717	185,434	18,953	188,449	.....	63,176	12,362	5,890	191,441
District 4	285,132	196,411	83,127	120,489	.....	25,201	37,931	21,135	142,617
East	255,861	72,893	.....	78,248	8,778	.....	.....	.....	142,207
District 7-B	200,352	5,289	21,323	107,502	6,350	13,851	2,875	.....	172,560
West	871,556	113,109	8,403	149,263	27,936	33,569	7,535	10,315	250,387
District 9	229,618	48,581	4,474	119,989	11,320	10,475	.....	4,723	82,364
District 10	306,345	35,660	66,268	27,827	6,065	25,745	21,490	9,610	23,796
Utah	11,274	.....	5,290	.....	.....	6,610	.....	.....	70,011
Washington	.....	.....	.....	.....	.....	.....	.....	.....	2,625
West Virginia	30,548	.....	156,100	12,539	2,220	.....	.....	.....	.....
Wisconsin	.....	.....	.....	.....	.....	.....	.....	.....	8,100
Wyoming	143,236	.....	28,812	85,544	.....	680	.....	10,270	157,343
Total U. S.	**6,688,434**	**1,117,129**	**1,532,440**	**3,115,513**	**389,595**	**407,030**	**142,861**	**189,202**	**3,437,002**
Western Canada	515,327	.....	96,082	99,940	19,332	39,652	.....	77,605	207,256
Alberta	398,554	.....	91,629	72,968	19,332	35,651	.....	65,371	130,207
Saskatchewan	103,690	.....	.....	20,332	.....	4,001	.....	1,772	20,671
Manitoba	3,808	.....	.....	1,970	.....	.....	.....	.....	.....
British Columbia	9,275	.....	4,453	4,670	.....	.....	.....	10,462	54,112
Northwest Territories	.....	.....	.....	.....	.....	.....	.....	.....	2,266

are calculating open-flow potential. Location is in Section 1, Block 104, Jasper CSL Survey. It lies 2 miles northeast of the 1 Jasper CSL, newly opened Clearfork and Canyon field.

Winkler County. United States Smelting, Refining, & Mining Co. have dual Devonian and Ellenburger production at 1 W. S. Jasper, 5 miles southeast of Kermit. The well flowed 317 bbl. of oil from Ellenburger at 11,820-50 ft. From Devonian at 9,612-52 ft. it flowed 235 bbl. per day. Well spots in Section 15, Block B-6, PSL Survey.

Gasser hit for Anadarko

In the northwestern corner of the Anadarko basin, Germany Investment Co. et al., Dallas, is completing the 1 W. K. Burchfield in C NE SW 4-32s-43w, Baca County, as a Topeka Pennsylvanian gas find.

This well was drilled to 3,450 ft., total depth, set 4½-in. casing at 3,334 ft. Operator is preparing to test a Topeka limestone at 3,250 ft. which gave gas on drill-stem test in open hole. This apparent strike is in the same limestone member as Horizon 1-10 Lepel, 4½ miles west, a recent discovery. The new well suggests a good size producing area may be present. The Lepel well is in C NE NE 10-32s-44w, rather than 42w, as previously stated.

Island Unit gas discovery completed in Uinta basin

The Uinta basin of Utah has an important new gas reservoir at Island Unit. Mountain Fuel Supply Co. completed 1 Island Unit in SE SW 7-10s-20e, Uintah County, flowing a calculated absolute open 23 M.M.c.f.d. Flow is from Wasatch Tertiary perforations at 5,487 to 5,569 ft.

This new field is 5½ miles northwest of Wasatch gas production on the Uintah unit. That well flowed 2,200 M.c.f.d. First producer on the Uintah unit was in 16-10s-21e. It is a shut-in gas well after flowing 5 M.M.c.f.d. from Wasatch.

First quadruple-pay well for North Louisiana

North Louisiana has its first quadruple producer.

It is in Ada field, in Webster Parish, where David Crow and Associates have completed their 1 Archie in the Jeter at 5,336-44 ft., two intervals in the Hill at 5,386-92 ft. and 5,420-44 ft., the Cook at 5,602-54 ft., and the Pettet at 6,603-16 ft. All zones are in the Glen Rose section.

The Jeter tested 1,621 M.c.f. of gas and 3 bbl. 61.1°-gravity condensate per day through 16/64-in. choke. The two Hill zones made 1,750 M.c.f. of gas and 9 bbl. of 63.6° - gravity condensate, also through 16/64-in. choke. The Cook zone got 1,096 M.c.f. of gas and 6 bbl. of 64.4°-gravity condensate through 11/64-in. choke. The Pettet flowed 2,662 M.c.f. of gas and 8 bbl. of 61.3°-gravity condensate through 11/64-in. choke.

Flowing pressures ranged from 1,068 psi. in the Jeter zone to 1,825 psi. in the Pettet. Hole was drilled to 6,646 ft., and has 7-in. casing to bottom.

Location is in the heart of the field, 3½ miles southeast of Dubberly, and 10 miles southeast of Minden.

Discovery wells

ALASKA

Kenai Peninsula:

Union Oil Co. 44-18 Union-Ohio Kenai unit, SE SE SE 18-4n-11w. Flowed 5,300 M.c.f.d. through 3/8-in. choke with tubing pressure of 1,550 psi. from interval at 5,688-5,728 ft. TD 6,020 ft. Well is 2½ miles south of Kenai gas field.

WESTERN CANADA

Alberta:

Hunt et al. 16-27 Buffalo Lake, LSD 16, 27-39-21w4. D3 oil discovery. TD 5,607 ft.

Francana Devonian et al. 7-35 Halliday, LSD 7, 35-27-13w4, Glauconitic gas discovery. TD 3,827 ft.

British Columbia:

Pan American A-1 Komie a-51-A, a-51-A-94-0-8. Slave Point gas discovery. TD 7,631 ft.

Triad BP c-88-I Pickell Creek, c-88-I-94-H-3. Bluesky gas discovery. TD 4,054 ft.

Sinclair Pacific b-39-D Julienne Creek, b-39-D-94-G-1. Triassic gas discovery. TD 6,207 ft.

CALIFORNIA

Colusa County:

Honolulu Oil Corp. 1 Balsdon unit, NE SE NE 34-14n-1w. IP 2,240 M.c.f.d. through 15/16-in. choke from perforations at 9,576-96 ft. TD 10,000 ft. Field discovery in Buckeye North field and deepest gas production in Sacramento Valley.

Santa Barbara County:

Texaco Inc. 3 Texaco - Monterey PRC 2,206.1, 1½ miles offshore in projected 11-4n-33w in Parcel D. No figures other than TD of 4,600 ft. released. Discovery well in Cuarta offshore field.

Sutter County:

Buttes Gas & Oil Co. 15 Buttes Community, SW NE NE 2-15n-1e. Well flowed 4 M.M.c.f.d. through ½-in. choke from undisclosed interval. TD 6,485 ft. Deeper pool discovery in Marysville Buttes field.

Cameron Oil Co.-McElroy Ranch Co. 1 Grimes Operating unit 9, 1,520 ft. N and 1,320 ft. E of SW corner of 9-14n-1e. IP 5 M.M.c.f.d. from casing perforations at 6,843-54 ft. and 6,858-68 ft. with shut-in pressure of 2,970 psi. and 500 M.c.f.d. from tubing perforations at 7,475-79 ft. TD 8,656 ft. Outpost and extension of Grimes field, 8,000 ft. southeast of nearest production.

SOUTH LOUISIANA

Acadia Parish:

Texas Gas Exploration Co. 1 Lovic Desormeaux, 33-10s-2w, 2 miles northeast of Southwest Mermentau field. IP 3,074 M.c.f.d., 208 BOPD, adjustable choke, 46°, GLR 14,770 cu. ft. per bbl., perf. 10,432-38 ft. TD 12,520 ft. New-field discovery.

Vermilion Parish:

Union Oil Co. of California 1 State Lease 3537, Township 15s-1w, in White Lake, 2 miles east of West White Lake field. IP 9,800 M.c.f.d., 243 BOPD, adjustable choke, 47.2°, TP 8,650 psi., perf. 14,352-62 ft. TD 14,859 ft. Discovery well of Northwest Lac Blanc field.

MICHIGAN

Macomb County:

J. O. Mutch 1 Nyland, NE SW NE 34-3n-13e, 5 miles southwest Chesterfield gas pool. AIP 40 BO, 3 M.M.c.f.d. gas. Elevation 600 rig floor, A-1 dolomite 2,590 ft., Brown Niagara reef 2,700 ft., Trenton lime 3,620 ft. TD 4,695 ft. Plugback to 2,853 ft. New oil pool.

Missaukee County:

Sylvannia Development Co. and R. B. Peckham 1 Dieterman, NW NW SW 23-21n-7w, 3 miles east McBain pool. AIP 22 BO, 690 M.c.f.d. Elevation 1,176 rig floor, Traverse lime 3,220 ft. TD 3,232. New pool discovery.

Oceana County:

Miller Brothers 1 Kurbatov, SW SW SE 12-16n-17w, 4 miles east Pentwater pool. AIP 10 BO. Elevation 678, Traverse lime 1,681 ft., pay 1,685 ft. TD 1,687 ft. New pool discovery.

MISSISSIPPI

Smith County:

Triad Oil & Gas Co. et al. 1 Dukes-Central Oil Co., NE SW SW 36-3n-6e. IP 130 BOPD (3-hour test), 10/64-in., 36.8°, GOR 469 cu. ft. per bbl., TP 600 psi., perf. 11,072-78 ft., Rodessa. TD 13,017 ft. Elev. 510 ft., Lower Cretaceous 8,322 ft., first Rodessa sand 10,998 ft., Hosston 11,830 ft. Discovery well of Traxler field.

NEW MEXICO

Eddy County:

Jack L. McClellan 1 Southern Union, 10 miles northwest of Maljamar in 1-16s-30e. IPF 150 BOPD, ½-in. choke, open hole at 2,976 ft. Premier sand. TD 3,005 ft. TP 60 psi., CP 175 psi. New oil discovery.

Lea County:

Amerada Petroleum Corp. 1-VC State, 10 miles southwest of Lovington in 36-17s-35e, 1 mile southeast of Vacuum field and 3 miles north of Reeves field. IPF 741 BOPD, 20/64-in. choke, 39.3°, GOR 783:1, TP 850 psi., packer. Abo reef 8,890-8,930 ft. TD 9,075 ft. PBTD 8,950 ft. New oil discovery.

Tennessee Gas Transmission Co. 1 U. S. Smelting-U.S.A., 30 miles northwest of Jal in 22-24s-32e, 5 miles north of Paducah field. IPP 44 BOPD, plus 10 BWPD, Delaware 4,914-19 ft. TD 5,014 ft. New oil discovery.

J. C. Williamson Oil Co. 1 Lovington-State, 9 miles south of Lovington in 25-17s-36e. IPP 66 BOPD, 44°, Penn. 9,698-9,720 ft. TD 9,765 ft. New oil discovery.

Rio Arriba County, Otero:

Continental Oil Co. 9-1 Haynes, NW SW 9-24n-5w. IPP 10 BOPD, Greenhorn 6,522-94 ft. Dakota 6,726-84 ft. shut in; Gallup 5,760-5,818 ft. Dakota 920 M.c.f.d., 20 bbl. cond. Gallup 40 BOPD, GOR 620:1, 42.2°. TD 6,966 ft. Triple producer. Greenhorn discovery, new pay.

El Paso Natural Gas Co. 92-2 Jicarilla-Apache, NE SW 29-27n-3w. IPF 2,396 M.c.f.d., ¾-in. choke, TP 188 psi., CP 495 psi., SITP 1,177 psi., SICP 1,177 psi. Mesaverde 6,110-70 ft. TD 8,413 ft. PBTD 6,340 ft. Mesaverde discovery, new pool.

OHIO

Portage County:

Northern Natural Gas Production Co. 1 John Goodell, Sec. 30, Shalersville Twp. IP 11 BOPD, 65 M.c.f.d., Clinton 4,178-4,244 ft. RP 1,250 psi. TD 4,349 ft. Oil and gas discovery.

OKLAHOMA

Cleveland County:

Sunray Mid-Continent Oil Co. 1 Truman-Rucker, NW SW NW 13-9n-3w. IP 80 BOPD, Second Bromide 9,624-40 ft. TD 9,791 ft. New oil discovery.

Ellis County:

Pan American Petroleum Corp. 1 Corless unit, NE SW 3-24n-25w. IPF 2,740 M.c.f.d., Morrow 7,601-49 ft. TD 7,952 ft. New gas discovery.

Garfield County:

Midland Oil Corp. 1 F. A. Baylor, SW NW 26-21n-5w. IPF 994 BOPD, 42° and 44°, upper Marshall sand 6,842-52 ft., lower Marshall 6,871-76 ft. TD 6,942 ft. Dual oil discovery.

(Continued on page 174)

Louis F. Davis

Atlantic's Davis Acts Fast

. . . on his problems. And he'll keep the habit when he takes over as general manager of domestic production.

WHEN the photo above was taken, Louis F. Davis of Atlantic Refining Co. was getting some bad news.

Drillers at a deep, expensive company well had found one of its prospective pays apparently too tight to produce.

Davis agreed with a plan for further treatment of the stubborn zone before giving up and moving back up the hole to test other sections. Later, the extra effort paid off and the zone began producing gas in quantities that may be commercial.

The call, dealing with a substantial investment, lasted about 2 minutes. After it was finished, Davis turned his attention to other matters.

This was typical. Another Atlantic executive commented recently, "Whenever you give Louis Davis a job, you know it will be done well and done quickly."

Atlantic has given Davis a bunch of jobs since he started with the company as pumper in East Texas field in 1935. His responsibilities have grown, too, until now he is assistant general manager of the domestic producing department.

Big job ahead . . . Late in May, Davis will take over a still bigger job as general manager of Atlantic's domestic production department. He will replace Edgar Kraus, who is retiring.

This job, Davis thinks, will become even more challenging as the years pass.

"We in domestic-producing operations are dealing with a territory that has limited boundaries. I can remember when there were more good deals available than there was money to drill them. Now prospects are fewer, drilling is continually deeper and more costly, and competition among operators for the good prospects is extremely keen."

Route to Atlantic . . . Davis, a native of Longview, Tex., was graduated from the University of Texas in 1934 as a mechanical engineer.

There was a great lack of demand for mechanical engineers in that depression year, and Davis repaired autos for $60 a month before accepting a chance to go to Texas A&M as a graduate assistant.

After a year of graduate work along with teaching freshman math and grading lab reports at the college, Davis started work in Dallas as a trainee with a utility company.

A few months later he snapped up the pumper's job offered by Atlantic because he felt it had a future. And also it meant he could live at home in Longview and cut expenses.

Promotions . . . Following his hitch as an East Texas field pumper, he held various field engineering jobs before going to Dallas again in 1946 as a senior engineer.

In 1951 he was named production superintendent of Atlantic's old operations division. Three years later, he moved to Tulsa as assistant manager of the former Oklahoma-Kansas region. He was promoted to manager of that region in 1956, returned to Dallas in 1958 as manager of the regional division, and moved up to his present post on February 1 of this year.

Named OIC head . . . Oil associations also have recognized Davis' talent for getting things done.

He has been active on several working committees of the American Petroleum Institute's division of production. While at Tulsa, he served as finance committee chairman for the Oklahoma-Kansas division of the Mid-Continent Oil and Gas Association.

He recently accepted an appointment to direct the industry public-relations program in North Texas for the Oil Information Committee of the Texas Mid-Continent Oil and Gas Association.

●

Harold E. Massey, district superintendent for Cities Service Petroleum Co., has been transferred to Guymon, Okla., from Gladewater, Tex.

William W. Little, foreman with Ohio Oil, has been transferred to Arlington Heights, Ill., from Muncie, Ind.

John M. Whelan, general traffic manager of American Oil Co., will retire March 1 after 38 years with the Standard Oil Co. (Ind.) companies. Whelan is currently president of the Transportation Club of the Petroleum Industry.

Personals

Joe J. King, senior vice president of Tennessee Gas Transmission Co., has been elected president of Tenneco Chemical Co., new TGT subsidiary formed to build and run a petrochemical installation on the Houston ship channel. **F. L. Padgitt,** director of project development for TGT, has been named vice president of Tenneco Chemical. Construction of the Tenneco Chemical project will start by June 1.

KING

H. A. Klamm has been named Los Angeles sales manager for Tidewater Oil Co.

J. C. Pate, assistant district manager of Gulf Oil Corp.'s Cleveland sales area, has been promoted to manager.

Lawrence H. Smith, eastern division geologist for Pure Oil Co. in Denver, has been transferred to Newark, Ohio, as area exploration manager.

Monroe V. Roberts, assistant production superintendent of Delhi-Taylor Oil Corp.'s Midland, Tex., district, has joined Castle & Wigzell, Midland independent operators, as supervisor of drilling and production in West Texas, southeast New Mexico, and Louisiana.

John C. Osmond, Salt Lake City consultant, has been elected president of the Rocky Mountain section of American Association of Petroleum Geologists. **Bill A. Street,** Pubco Petroleum Corp., has been named vice president, and **Derral F. Mecham,** Ohio Oil Co., has been named secretary-treasurer. State representatives are **Daniel S. Turner,** Dan Turner & Associates, Colorado; **Robert B. Austin,** The California Co., Montana; **Curtis Little,** Albuquerque consultant, New Mexico; **Erwin W. Clark,** Standard Oil Co. of California, Utah; and **Jerry F. Davis,** Superior Oil Co., Wyoming.

Arthur W. Clinger has been named vice president and general manager of sales for South Penn Oil Co. In the new post he will supervise the company's branded lubricating department and the retail marketing department. Clinger will also continue as vice president and manager of wholesale sales.

F. M. Blough, district manager for Standard Oil Co. (Ind.) in Fort Wayne, Ind., has been named managing director of Amoco Australia, Ltd., new Australian marketing and refining subsidiary. Headquarters of the company will be in Sydney and a refinery is planned near Brisbane.

George Reneau, Rocky Mountain area consultant, has joined Alco Oil & Gas Corp. as manager of production and chief engineer. **Leonard Swords,** chief geologist for Union Oil Co.'s Rocky Mountain division, has joined Alco as manager of exploration.

J. Ainslie Bell and **B. Frank Lamb** have formed Pennant Operating Co., production management firm, with offices in Bakersfield, Calif., and Los Angeles. Bell, a petroleum engineer and partner in Beach, Church & Bell, will be president. Lamb, former general superintendent of Ring Oil Co., will be vice president and manager of field operations.

Walter B. Dingle, Edmonton division manager for Imperial Oil, Ltd., has been transferred to Toronto headquarters where he will join the company's producing-management staff. **Vern H. Hunter,** Regina division manager since 1955, will succeed Dingle as Edmonton manager. **John D. Harvie,** western regional manager of the economics and statistics department in Calgary, will succeed Hunter as Regina manager. **George E. Schultis,** assistant Regina division manager, has been transferred to Edmonton as assistant manager. He will be succeeded by **Douglas B. Layer,** regional exploration manager in Calgary. **Peter H. N. White,** assistant regional exploration manager in Calgary, will replace Layer. **G. Keith Whynot,** senior analyst in the regional economics and statistics department, Calgary, will succeed Harvie as department manager.

Three regional managers and four area managers have been named in Humble Oil & Refining Co.'s southwest region. The regional managers, with headquarters in Houston, are **R. C. Barbour,** regional production manager; **J. L. Loftis,** regional exploration manager; and **J. C. Wilbourn,** regional marketing manager. The three men formerly held posts in the old Humble division. Barbour was manager of the production department; Loftis was acting chief geologist; Wilbourn was assistant manager of the marketing department. Area operating offices have been set up within the southwest region in Houston, Dallas, Corpus Christi, and Midland. Managers of these offices are **W. E. Dougherty,** Corpus Christi; **J. S. Bell,** Houston; **H. E. Potter,** Dallas; and **J. C. Posgate,** Midland. The new managers also come from the Humble division. Dougherty was acting assistant manager of the exploration department; Bell was Gulf Coast area production manager; Potter, East Texas area production manager; and Posgate, manager of the crude-oil department. Humble's new regional setup was announced in December (OGJ, Dec. 19, 1960, p. 66).

BARBOUR

LOFTIS

WILBOURN

J. A. Saunders, district superintendent for Frankfort Oil Co. in Amarillo, Tex., has been transferred to Midland, Tex., in the same capacity.

Kenneth F. Keller, Houston district superintendent for Mobil Oil Co., has been named exploration manager of the Midland, Tex., division. He succeeds **O. H. Blexrud,** recently named president of Mobil Oil of Canada, Ltd.

BARROSO

Geonisio Barroso has been named president of Petroleo Brasileiro, S.A., Brazil's government oil agency, by new Brazilian President **Janio Quadros.** Barroso joined Petrobras as a field engineer. He most recently had been manager of operations in the Bahia area.

Bill S. McGowen, geologist with Continental Oil Co., has been transferred to Lafayette, La., from Fort Worth.

Roy F. Deck, production superintendent for Wilcox Oil Co., has been transferred to Kingman, Kans., from Bristow, Okla.

Driscoll A. Henkhaus, seismic party chief for Humble, has been transferred to Carlsbad, N. M., from Lovington, N. M.

J. A. Couvillon has joined Falcon Seaboard Drilling Co. as district drilling and production engineer in Lafayette, La. He had been with Pan American Petroleum Corp. in the Louisiana Gulf Coast area since 1942.

J. B. Gardner, research chemist in Dow Chemical Co.'s organic basic-research laboratory, Freeport, Tex., and **R. E. Lane,** research chemist in organic process development, have been promoted to senior research chemists.

H. A. Nedom, Amerada Petroleum Corp., has been elected chairman of the Mid-Continent section of AIME's Society of Petroleum Engineers. Other new officers are **Wayne E. Swearingen,** Swearingen Engineering Co., first vice chairman; **George C. Howard,** Pan American Petroleum Corp., second vice chairman; **Philip L. Essley, Jr.,** Skelly Oil Co., secretary; and **B. D. Tarbel,** Helmerich & Payne, treasurer. Members of the executive committee are **Fraser H. Allen,** Pan American; **Bruce Bleakley,** The Oil and Gas Journal; **H. Alan Nelson,** Blackwell Oil & Gas Co.; **Kenneth Eilerts,** Bureau of Mines; and **R. V. Smith,** Phillips Petroleum Co.

Barrett J. Williams, geologist with Pan American Petroleum, has been transferred to Denver from Billings, Mont.

Richard W. Stamp, geologist with Standard Oil Co. of Texas, has been transferred to Midland, Tex., from Houston.

James M. Perkins, senior exploration geologist for Mobil Oil Co., has been transferred to Houston from Jackson, Miss.

Ward Killingsworth, Jr., production superintendent in Dumas, Tex., for Shamrock Oil & Gas Corp., has been promoted to manager of drilling operations in Amarillo, Tex.

Dr. S. Y. Wong, Ponca City, Okla., has been promoted to superintendent of the process laboratory in Continental Oil Co.'s petroleum-products research division.

John Stoker has been named production superintendent of Woods Exploration & Producing Co. **Allen Reid** has been named drilling superintendent.

David Knapp, Standard Oil Co. of California, has been named a director and vice president for European marketing activities of California Chemical International, a California Standard subsidiary. He will headquarter in Geneva.

Charles H. Ward, project engineer with Williams Bros. Co. in Tulsa, has joined Northern Natural Gas Co. as director of the engineering-design department. He will headquarter in Omaha. Ward had been with Williams Bros. since 1956. He had handled design and construction assignments in the U. S., Middle East, and South America.

Richard C. Dixon, manager of Panhandle Eastern Pipe Line Co.'s gas-purchase section, has been named administrative assistant to **R. B. Harkins,** vice president. **Richard L. Matheson** will succeed Dixon.

▶▶▶ Personals

George W. Jandacek, assistant to the manager of DX Sunray Oil Co.'s Duncan, Okla., refinery, has been named general manager of the Suntide Refining Co. Corpus Christi, Tex., plant. **J. L. Laird** will continue as plant manager in Corpus Christi. **J. A. Hutsell,** plant superintendent for Suntide, has been named manager of operations. **J. H. Miller,** manager of process and control engineering, has been named manager of technical services, and **L. W. Plummer,** chief mechanical engineer, has been named manager of maintenance and plant engineering.

JANDACEK

W. B. Macey, president of Western Development Co., has moved to Denver from Artesia, N. M. Headquarters of the producing company have been switched to Denver from Santa Fe.

Karl M. Zogg, staff reservoir engineer for Sunray Mid-Continent Oil Co., has joined Oil Recovery Corp. as evaluation engineer in the Tulsa division office. **Frank Small,** project engineer in Dewey, Okla., has been transferred to Chanute, Kans., as project engineer for the Keas Orco flood project there.

W. J. Greenwald has been named general manager of the natural-gas division in Humble's headquarters organization, Houston. The division will be responsible for all natural-gas sales. **John J. Carter** has been named manager, natural-gas division, and will assist in handling natural-gas sales. **Carl Illig** has been elected associate general counsel in the headquarters organization. He succeeds **Forrest M. Darrough,** now general counsel. Illig has been a member of the board of management and general counsel of the Humble division. Greenwald had been acting assistant manager of producing-investment coordination in the Humble division and Carter was manager of the division's gas department.

Douglas G. G. Levick, marketing coordinator of Standard - Vacuum Oil Co., has joined the marketing - coordination department of Standard Oil Co. (N. J.), as marketing adviser for the Far East and South and East Africa. Levick has been with the Jersey companies since 1931. He had been with Esso Standard and Carter before joining Stanvac in 1948.

Jed J. Miller, process engineer for El Paso Natural Gas Products Co., has been transferred to El Paso, Tex., from Odessa, Tex.

J. R. Webb, gas department superintendent in Pure Oil Co.'s southwestern production division, Tulsa, has been named gas-contracts supervisor in Denver.

J. L. Atkinson, vice president of Woods Petroleum of Canada, Ltd., has been named manager of Apache Corp.'s Canadian operations with headquarters in Calgary. Apache recently purchased Woods Petroleum (OGJ, Feb. 20, p. 91).

Robert A. Meek, geologist with Continental Oil Co., has been transferred from Casper, Wyo., to Billings, Mont.

Peter C. Smith, area geologist for Pan American Petroleum Corp. in Houston, has been named Houston district geologist.

R. Glen Yetter, geologist with The California Co. in New Orleans, has opened offices as consulting geologist in Lincoln, Neb.

Dr. Madan M. Singh has joined Gulf Research & Development Co. in Pittsburgh as research engineer in the drilling section, production-engineering division.

Charles E. Reeder, vice president and manager of Rocky Mountain area exploration for Flank Oil Co., has opened offices in Denver as an independent operator.

Louis A. Walstrom, Jr., and **G. Ross Miller** will manage the new exploration office opened in Denver by Petan Co., Santa Barbara, Calif. Walstrom and Miller were with Pan American Petroleum Corp. in the Rocky Mountain division before joining Petan.

▶▶▶ Personals

Max G. Merrill, geologist with Humble, has been transferred to Amarillo, Tex., from Wichita.

A. D. Simpson, production foreman with Amerada Petroleum Corp., has been transferred to Great Bend, Kans., from Bronco, Tex.

H. E. Schafer, division superintendent of production for Pure Oil Co. in Tulsa, has been promoted to manager of operations in Denver.

Howard M. Johnson, production foreman with Tennessee Gas & Oil Co., has been transferred to Shreveport, La., from Farmington, N. M.

Dr. Luis Alcala Sucre has been named vice president of Mene Grande Oil Co., Gulf Oil's Venezuelan subsidiary. He succeeds **W. W. Adams,** who has been transferred to Gulf's Houston offices.

Dr. Marshall E. Milligan has joined Skelly Oil Co. as chief economist. Milligan has been a professor of economics at the University of Tulsa for the past 5 years and was with Pan American Petroleum before that time.

▶▶▶ Deaths

Frank M. Johnston, 73, Rawlins, Wyo., oil man, died February 13 in a Denver nursing home. Johnston was a pioneer in discovery and development of Wyoming's Lost Soldier and Mahoney Dome fields. He was president of Mahoney Dome Co.

Roland G. Swaffield, 77, Long Beach, Calif., attorney who won the city's first tidelands suit against oil producers, died February 15 in an Inglewood, Calif., hospital. Swaffield had practiced law in Long Beach for over 50 years. He was legal counsel for the city when the first tidelands suit was tried.

George Johnston, 58, who held the record for continuous service with Creole Petroleum Corp., died February 13 in Caracas. At the time of his death he was an executive in Creole's marine department. Johnston was with Shell in Mexico before moving to Venezuela with Lago Petroleum in 1925. Lago, an Indiana Standard company, was absorbed by Creole in 1932.

Donald L. Jones, 54, consulting petroleum engineer with Continental Oil Co., died February 11 in a Billings, Mont., hospital. Jones was assistant general manager of Conoco's Rocky Mountain district from 1934 to 1940.

George Kelly, Sr., 64, retired sales engineer for Atlantic Refining Co., died February 11 in Philadelphia.

Charles M. Tobey, 56, manager of Gilmer Oil Co. in Altura, Colo., died February 4 at his home in Aurora, Colo.

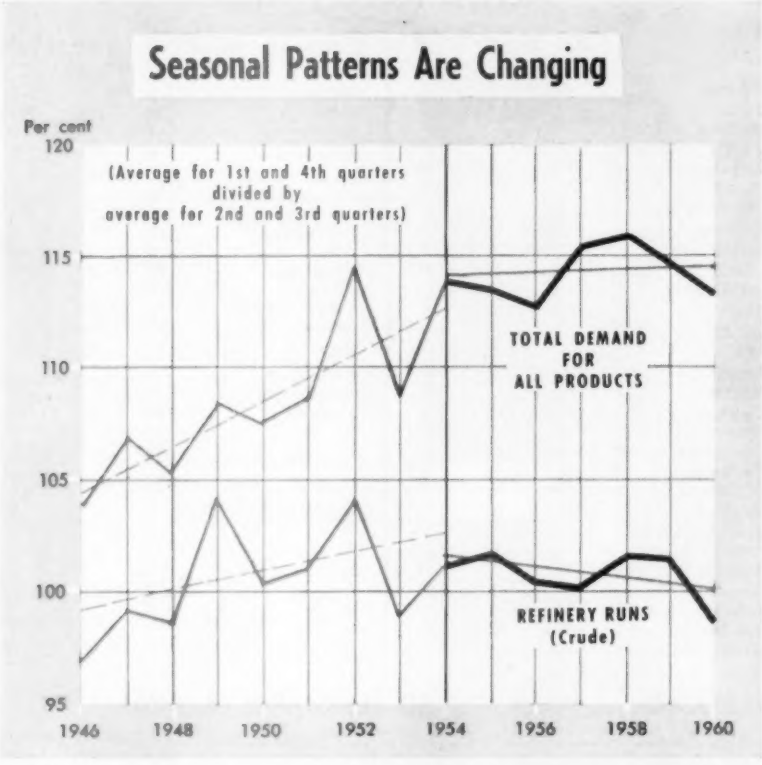
John Abel Teter, 61, area office manager of Oil Well Supply division of U. S. Steel Corp., died February 19 in a Tulsa hospital.

William Cochrane, 76, retired legal counsel for Sinclair Oil & Gas Co., died February 19 in a Tulsa nursing home. Cochrane retired in 1945.

Felix E. Bowen, 77, Tulsa drilling contractor, died February 16 in a Tulsa hospital. He had been retired for several years because of poor health.

Thomas G. Nicholson, 26, partner in Nicholson & Wilson Well Servicing, Fairfield, Ill., died February 11 in an auto accident near Belmont, Ill.

Louis Noe Mistrot, 74, retired district production superintendent for Arkansas Fuel Oil's Arkansas division, died February 10 in an El Dorado, Ark., hospital. Mistrot entered the oil business in the old Jennings field in 1907. He was superintendent of Houston Oil Co. during development of the El Dorado and Smackover fields.



POINTS on the top line show ratios of winter demand to summer demand. Winter demand is the average for first and fourth quarters of the year. Summer demand is the average for second and third quarters. Points on bottom line represent corresponding ratios for refinery runs. Both series are plotted as per cent.

If you can't sell it, be sure you can store it

BY JOHN C. CASPER

TOTAL DEMAND for petroleum products last year was 13.35% higher in winter quarters than in summer quarters, but refinery runs averaged 1.27% more in the summer quarters. The difference had to be covered by inventory changes.

The irregular line, representing the postwar seasonal-demand pattern, highlights several important facts about total demand for petroleum products.

... **Winter demand** has exceeded summer demand every year since the end of World War II. The winter-summer ratio was 103.69 for the year 1946. That was the lowest in the postwar period.

... **Winter-summer ratio** climbed rapidly for the first 8 years after the war. The record for this period was in 1952 when winter demand was 14.45% larger than summer demand.

The calculated trend line for the period shows a gain of 8.6 percentage points in 8 years or a little better than one percentage point per year.

... **Winter - summer** percentages have been leveling off in recent years. The demand line on the chart is divided to show two periods, from 1946 to 1954 and 1954 to 1960. The trend line for the more recent period shows a gain of less than one percentage point in 6 years. It takes a real slowdown to drop from 8.6 points in 8 years to less than 1 point in 6 years.

Both the big winter gains in the early postwar period and the slowdown in recent years can be credited in part to changes in sales of distillate for home heating.

In the late forties distillate took the lion's share of the new-home market and displaced coal in older homes. Over-all oil sales climbed much faster in winter than in summer.

The period of coal displacement is over, and gas is crowding distillate in the new-home market. The winter-summer demand ratio has leveled off and may follow a downward trend in the sixties.

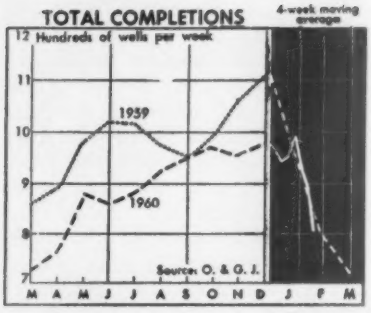
Winter refinery runs lagged demand in the 1946-54 period. In no year did winter runs exceed summer runs by as much as 5%. Refiners tend to keep runs at about the same level in winter and summer. Actually, summer runs have exceeded winter runs in five of the years since World War II.

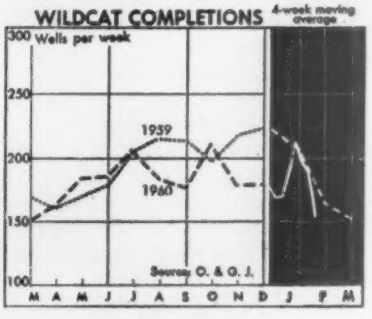
This failure to tailor runs to demand must be offset by large stock changes. And unless refiners make definite plans for storing the summer excess, the demand-run trend will continue to act as a market depressant. Take a look at your demand-run ratio this summer.

A quick look at the highlights . . .

	LATEST WEEK	Change from WEEK AGO		Change from YEAR AGO	
Production	7,147,200	DOWN	14,745	DOWN	114,443
Crude stocks	232,231,000	DOWN	990,000	DOWN	16,685,000
Completions	869	UP	87	UP	16
Refinery runs	8,447,000	UP	42,000	UP	366,000
Gasoline stocks	218,003,000	UP	2,673,000	UP	5,061,000
Kerosine stocks	23,944,000	DOWN	1,070,000	UP	957,000
Distillate stocks	97,329,000	DOWN	3,211,000	DOWN	15,268,000
Residual stocks	42,777,000	UP	640,000	DOWN	3,644,000
Four-product stocks	382,053,000	DOWN	968,000	DOWN	12,894,000
Total imports	2,007,600	UP	228,700	UP	140,100

Active Rotary Rigs





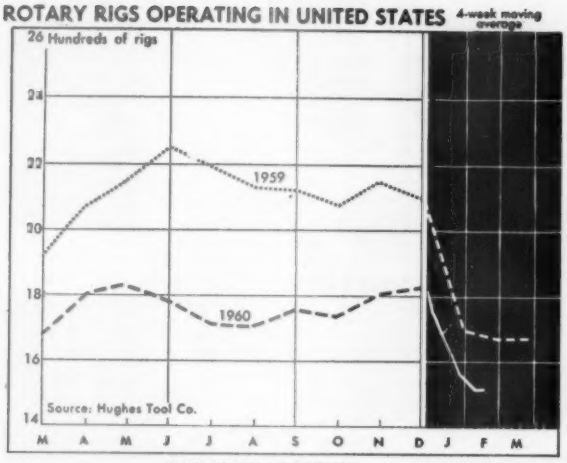
	2-20-61	2-13-61	2-22-60
Alabama	5	6	3
Alaska	7	7	(*)
Arkansas	15	13	14
Arizona	1	1	1
California	70	62	74
Land	66	60	69
Offshore	4	2	5
Colorado	19	22	26
Florida	2	2	1
Land	1	1	0
Offshore	1	1	1
Illinois	19	32	19
Indiana	2	6	4
Iowa	0	0	1
Kansas	107	100	96
Kentucky	4	4	5
Louisiana	274	254	290
North	25	21	27
S. Inland waters	104	96	111
S. Land	87	84	94
Offshore	58	53	58
Michigan	21	21	34
Mississippi	46	44	79
Missouri	1	1	1
Montana	18	19	12
Nebraska	21	18	24
Nevada	1	1	0
New Mexico	91	98	90
North Dakota	14	15	13
Ohio	6	4	3
Oklahoma	176	168	187
Oregon	1	1	0
Pennsylvania	6	7	9
Texas	543	498	615
S. Inland waters	6	6	3
S. Land	146	130	171
Offshore	2	1	0
North	44	43	44
Panhandle	49	48	56
East	40	36	53
West Central	†148	†128	192
West	108	106	96
Utah	32	24	29
Washington	1	1	0
West Virginia	6	7	3
Wyoming	44	43	50
Total U. S.	1,553	1,479	1,683
Western Canada	197	195	255
Eastern Canada	0	0	4
Grand total	1,750	1,674	1,942

Hughes Tool Co. report. *Data first reported 4-4-60. †Stephens and Eastland counties now included in West Central.

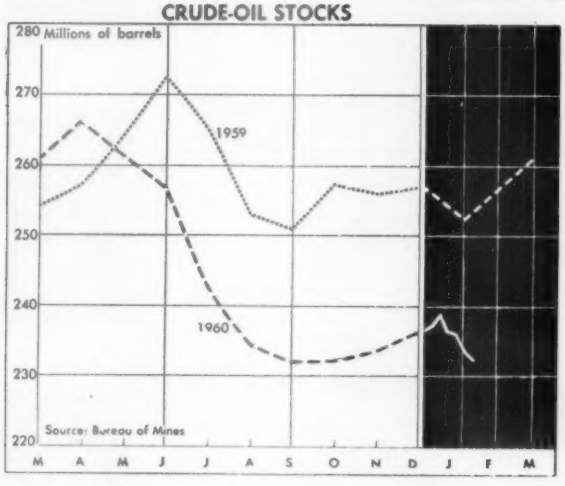
WEEKLY WELL COMPLETIONS . . . WEEK ENDED FEBRUARY 18, 1961

	Total wells							Cum.		Total wildcats					Cum.	
	Total	Crude	Cond.	Gas	Dry	Service	Footage	1961	1960	Total	Crude	Cond.	Gas	Dry	1961	1960
Arkansas	6	4	0	0	2	0	19,371	63	92	0	0	0	0	0	20	24
California	24	15	0	5	3	1	114,289	260	190	4	0	0	2	2	35	43
Colorado	11	1	0	4	6	0	54,295	94	110	5	0	0	2	3	56	55
Illinois	39	13	0	0	13	13	75,277	282	403	7	1	0	0	6	55	97
Indiana	15	5	0	1	9	0	17,864	105	147	5	0	0	1	4	19	53
Kansas	74	37	0	8	22	7	179,972	716	517	18	4	0	1	13	144	161
Kentucky	13	2	0	3	8	0	14,925	169	325	3	0	0	1	2	17	40
Louisiana	41	13	0	10	18	0	300,879	512	489	5	0	0	0	5	70	64
North	11	6	0	4	1	0	27,960	183	165	1	0	0	0	1	27	29
South	27	7	0	4	16	0	242,750	258	242	4	0	0	0	4	40	30
Offshore	3	0	0	2	1	0	30,169	71	82	0	0	0	0	0	3	5
Michigan	18	11	0	2	5	0	61,333	113	105	8	3	0	0	5	51	40
Mississippi	14	5	0	0	9	0	139,080	97	104	4	0	0	0	4	37	39
Montana	8	2	0	0	6	0	56,387	58	40	5	0	0	0	5	27	22
Nebraska	23	11	0	0	12	0	103,283	98	106	10	1	0	0	9	45	41
New Mexico	40	24	0	9	7	0	206,014	244	296	7	3	0	0	4	38	41
West	14	4	0	8	2	0	75,364	104	101	1	0	0	0	1	14	9
East	26	20	0	1	5	0	130,650	140	195	6	3	0	0	3	24	32
New York	0	0	0	0	0	0	0	119	50	0	0	0	0	0	2	5
North Dakota	2	2	0	0	0	0	17,420	31	40	0	0	0	0	0	6	7
Ohio	21	12	0	8	1	0	58,430	134	186	0	0	0	0	0	7	10
Oklahoma	165	92	0	15	42	16	588,140	749	568	14	3	0	2	9	91	111
Pennsylvania	52	19	0	20	4	9	149,488	102	67	3	0	0	2	1	7	5
Texas	259	139	10	14	92	4	1,100,104	2,046	2,341	40	4	0	1	35	434	499
Dist. 1	17	10	1	0	6	0	54,919	123	172	3	0	0	0	3	42	66
Dist. 2	6	1	3	0	2	0	50,361	103	98	2	0	0	0	2	22	26
Dist. 3	14	4	1	2	7	0	82,563	155	200	5	0	0	0	5	41	39
Dist. 4	20	9	1	2	8	0	107,877	197	200	0	0	0	0	0	49	60
East	19	12	0	0	7	0	83,013	168	196	4	0	0	0	4	39	40
Dist. 7-B	34	23	0	1	10	0	95,762	282	316	5	2	0	0	3	79	92
West	69	41	1	3	20	4	384,730	483	619	14	1	0	1	12	100	104
Dist. 9	60	35	2	0	23	0	153,378	346	400	4	1	0	0	3	46	64
Dist. 10	20	4	1	6	9	0	87,501	189	142	3	0	0	0	3	16	8
Utah	3	1	0	0	2	0	19,389	25	42	2	0	0	0	2	19	16
West Virginia	22	4	0	15	3	0	52,967	142	126	0	0	0	0	0	0	1
Wyoming	16	5	0	1	10	0	88,641	149	134	9	0	0	0	9	66	55
Misc. (Alaska, Fla.)	3	1	0	0	2	0	31,388	55	22	2	0	0	0	2	44	12
Total U. S.	869	418	10	115	276	50	3,448,936	6,363	6,500	151	19	0	12	120	1,290	1,441
Previous week	782	354	13	79	275	61	3,026,951	.....	.....	159	12	1	9	137	.....	.....
Cum. 1961	6,363	2,888	174	605	2,316	380	26,040,870	.....	.....	1,290	105	19	54	1,112	.....	.....
Cum. 1960	6,500	3,015	210	588	2,481	206	27,981,134	.....	.....	1,441	140	14	45	1,242	.....	.....
Western Canada	67	32	0	6	26	3	404,874	344	311	24	2	0	2	20	105	85

ROTARY RIGS OPERATING IN UNITED STATES



CRUDE-OIL STOCKS



CRUDE-OIL STOCKS BY STATES OF ORIGIN*

(Thousands of barrels)

	2-11-61	2-4-61	2-13-60
Pennsylvania	2,109	2,127	2,330
Other Appalachian	1,294	1,234	1,873
Illinois, Indiana, Michigan	8,901	8,754	9,792
Nebraska and North Dakota	2,912	2,694	2,560
Kansas	9,152	9,076	9,335
Oklahoma	15,292	15,390	16,950
Arkansas	1,652	1,683	2,187
Louisiana	17,796	18,620	18,867
North	3,143	3,256	2,972
South	14,653	15,364	15,895
Mississippi, Alabama, Florida	1,754	1,947	2,251
New Mexico	7,153	7,452	7,359
Texas	97,627	97,800	105,834
East Texas	7,936	8,206	8,114
West Texas	44,887	44,601	49,254
Texas Gulf	16,667	16,650	19,105
Other Texas	28,137	28,343	29,361
Wyoming	17,011	17,064	17,355
Other Rocky Mountain	9,838	10,104	9,255
California	25,248	25,323	28,595
Foreign	†14,492	13,953	14,373
Total	**232,231**	233,221	248,916

*Bureau of Mines. †Includes 4,568,000 bbl. in California.

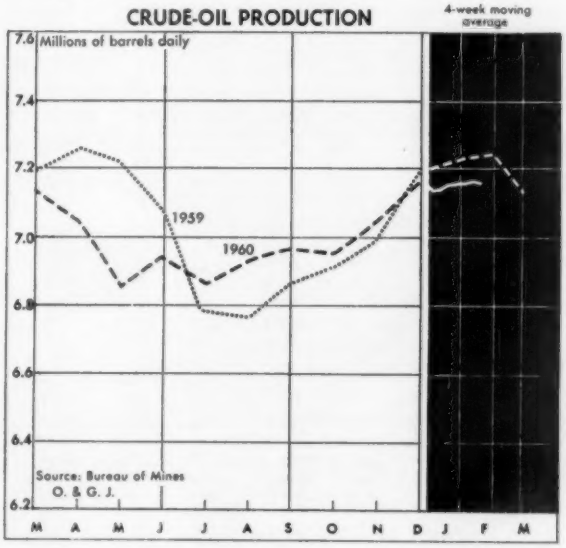
DAILY AVERAGE PRODUCTION FOR WEEK

	February 18, 1961			Feb. 11
	Crude oil	Lease condensate	Total	total
Alabama	21,000	.....	21,000	20,870
Alaska	7,500	.....	7,500	7,000
Arkansas	78,150	150	78,300	78,175
California	825,000	.....	825,000	825,500
Colorado	132,000	.....	132,000	131,800
Eastern	35,600	.....	35,600	36,000
Florida	1,000	.....	1,000	1,000
Illinois	212,200	.....	212,200	211,500
Indiana	31,700	.....	31,700	33,200
Kansas	†308,000	.....	†308,000	†302,300
Kentucky	56,300	.....	56,300	56,600
Louisiana	990,600	147,450	1,138,050	1,138,050
North	105,600	6,200	111,800	111,800
South	885,000	141,250	1,026,250	1,026,250
Michigan	49,600	.....	49,600	49,500
Mississippi	146,700	4,250	150,950	150,950
Montana	81,200	.....	81,200	82,000
Nebraska	66,100	.....	66,100	65,100
Nevada	50	.....	50	50
New Mexico	291,500	8,500	300,000	300,000
North Dakota	68,900	.....	68,900	67,000
Oklahoma	†503,100	.....	†503,100	†513,500
Texas	2,500,000	100,350	2,600,350	2,600,350
Dist. 1	42,000	3,700	45,700	45,700
Dist. 2	104,000	8,400	112,400	112,400
Dist. 3	317,000	41,000	358,000	358,000
Dist. 4	177,000	15,000	192,000	192,000
Dist. 5	27,000	500	27,500	27,500
Dist. 6	113,000	8,500	121,500	121,500
East Texas field	132,000	.....	132,000	132,000
Dist. 7-B	128,000	400	128,400	128,400
Dist. 7-C	113,000	4,050	117,050	117,050
Dist. 8	1,057,000	13,000	1,070,000	1,070,000
Dist. 9	189,000	3,800	192,800	192,800
Dist. 10	101,000	2,000	103,000	103,000
Utah	96,000	.....	96,000	108,500
Wyoming	383,600	.....	383,600	382,400
Others	‡700	.....	‡700	‡700
Total U. S.	6,886,500	260,700	**7,147,200**	7,161,945
Change from prev. week, down	.....	.....	**14,745**	
Canada	†573,800	.....	†573,800	†557,400

Total U. S. Prod.—Jan. 1-Feb. 18 ..... 350,800,000 bbl.
Same period last year (crude plus cond.) ..... *354,435,300 bbl.

*Includes 10,981,300 bbl. condensate. †Week ended previous Monday. ‡South Dakota and Arizona.

CRUDE-OIL PRODUCTION



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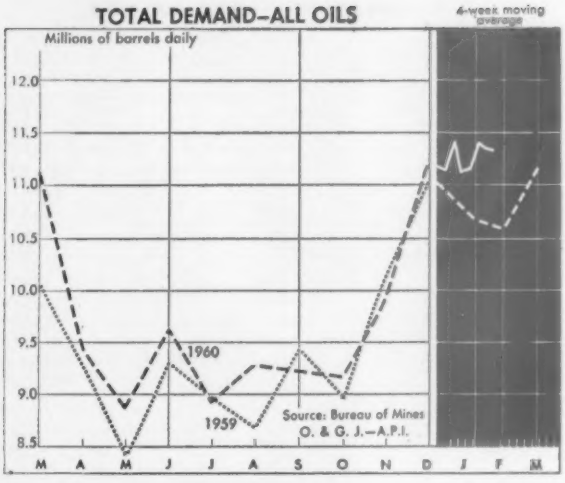

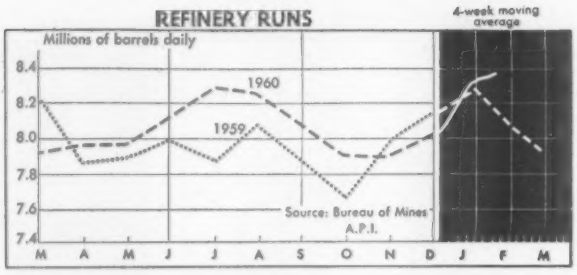

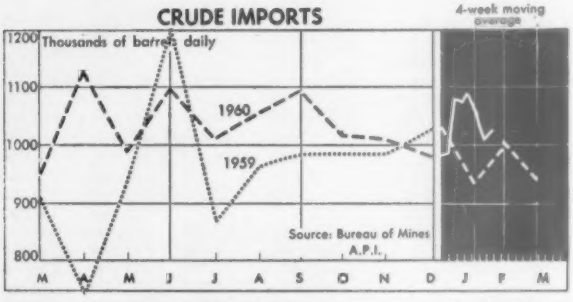

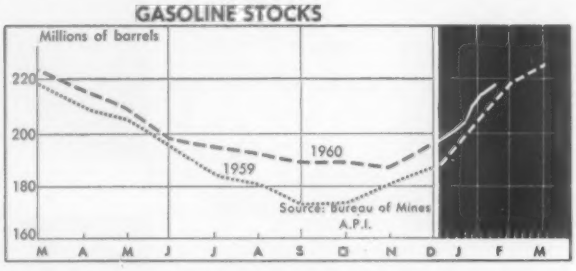

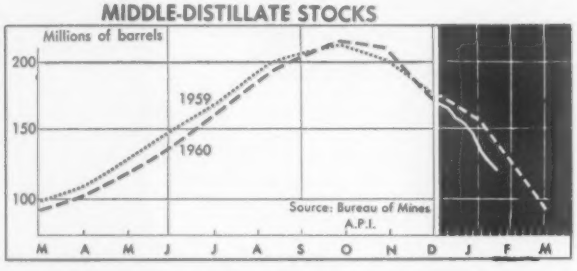

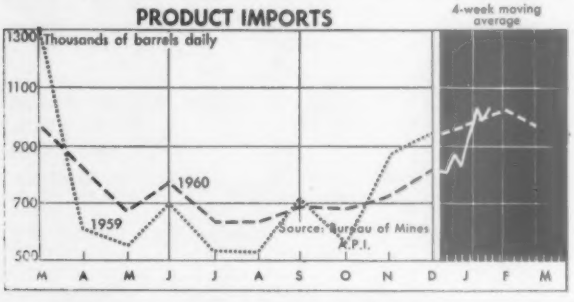

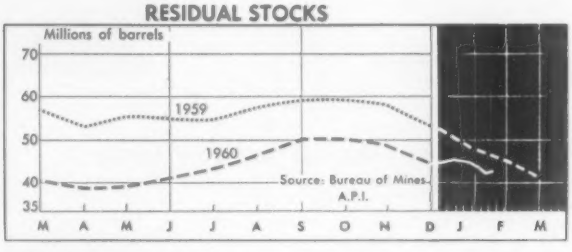

API REFINERY REPORT—FEBRUARY 17, 1961

(Thousands of barrels)

District—	Daily avg. runs	Daily average production Gaso.*	Kero.	Dist.	Resid.	Stocks‡ Gaso.†	Kero.	Dist.	Resid.	Bureau of Mines, February 1960 Daily avg. runs	Daily average production Gaso.*	Kero.	Dist.	Resid.
East Coast	1,173	529.0	25.6	479.0	110.6	46,132	9,417	30,503	12,668	1,117	538.3	33.8	321.0	173.1
Appalachian:														
Dist. 1	101	41.3	3.7	27.0	15.6	5,687	619	2,586	526	98	40.9	3.7	21.1	14.9
Dist. 2	74	42.7	5.4	17.7	10.2	3,083	305	976	280	106	54.8	7.4	18.3	15.4
Ind., Ill., Ky.	1,518	753.4	78.6	378.7	194.0	37,503	4,588	16,555	5,132	1,489	769.2	68.5	314.0	206.7
Minn., Wis., Dak.	129	64.7	3.0	32.0	19.3	6,752	715	5,055	625	117	54.2	4.9	26.8	19.0
Okla., Kans., Mo.	747	412.0	25.0	201.0	26.3	20,540	1,063	9,584	800	741	410.2	15.1	186.6	31.3
Inland Texas	292	206.0	11.4	50.4	21.6	7,982	483	1,419	2,458	292	205.3	10.1	44.4	22.6
Texas Gulf Coast	2,034	947.9	123.6	569.2	137.3	33,020	2,921	8,572	5,179	1,902	956.2	120.4	453.1	140.4
La. Gulf Coast	747	378.4	82.7	220.3	57.3	12,906	1,306	3,844	1,286	663	333.0	63.1	130.3	50.0
N. La. and Ark.	110	64.0	3.6	23.0	5.7	5,892	440	2,224	137	109	66.7	7.6	22.3	6.9
Rocky Mountain:														
New Mexico	25	13.3	1.0	6.0	2.9	878	43	140	58	25	13.1	0.4	4.0	2.3
Other Rocky Mt.	285	139.0	7.1	63.4	31.4	7,384	426	2,280	1,008	302	141.4	4.4	70.4	35.3
West Coast	1,212	506.7	46.0	208.7	249.4	30,244	1,618	13,591	12,620	1,104	535.8	19.5	176.6	280.0
Feb. 17, 1961	8,447	4,098.4	416.7	2,276.4	881.4	218,003	23,944	97,329	42,777	8,065	4,119.1	358.9	1,788.9	997.9
Feb. 10, 1961	8,405	4,064.6	450.4	2,237.4	1,002.6	215,330	25,014	100,540	42,137	.....	.....	.....	.....	.....
Feb. 19, 1960	8,081	4,074.0	299.9	1,802.7	969.3	212,942	22,987	112,597	46,421	.....	.....	.....	.....	.....

*At refineries including natural blended. †Finished and unfinished. ‡At refineries, bulk terminals, in transit, and in pipelines.

Crude-Oil Prices

GRAVITY SCHEDULE

	Signal Hill, Calif.	Oklahoma	West Tex. (sour)	West Tex. (Inter.)	No.* Texas	Texas Refugio Light	Bayou Sale (La.)	Denver Jules-burg	Wyo. (sour)
14-14.9	$1.86	....	....	....	....	....	....	....	....
15-15.9	1.93	....	....	....	....	....	....	....	1.81
16-16.9	2.00	....	....	....	....	....	....	....	1.86
17-17.9	2.06	....	....	....	....	....	....	....	1.96
18-18.9	2.13	....	....	....	....	....	....	....	1.96
19-19.9	2.20	....	....	....	....	....	....	....	2.01
20-20.9	2.27	$2.49	$2.35	$2.61	$2.29	$2.95	$2.90	$2.58	2.06
21-21.9	2.33	2.52	2.38	2.63	2.33	2.97	2.92	2.60	2.11
22-22.9	2.40	2.55	2.41	2.65	2.37	2.99	2.94	2.62	2.16
23-23.9	2.46	2.58	2.44	2.67	2.41	3.01	2.96	2.64	2.21
24-24.9	2.53	2.61	2.47	2.69	2.45	3.03	2.98	2.66	2.26
25-25.9	2.60	2.64	2.50	2.71	2.49	3.05	3.00	2.68	2.31
26-26.9	2.67	2.67	2.53	2.73	2.53	3.07	3.02	2.70	2.36
27-27.9	2.74	2.70	2.56	2.75	2.57	3.09	3.04	2.72	2.49
28-28.9	2.81	2.73	2.59	2.77	2.61	3.11	3.06	2.74	2.54
29-29.9	2.87	2.76	2.62	2.79	2.65	3.13	3.08	2.76	2.59
30-30.9	2.93	2.79	2.65	2.81	2.69	3.15	3.10	2.78	2.63
31-31.9	3.00	2.82	2.68	2.83	2.73	3.17	3.12	2.80	2.67
32-32.9	3.06	2.85	2.71	2.85	2.77	3.19	3.14	2.82	2.71
33-33.9	3.12	2.88	2.74	2.87	2.81	3.21	3.16	2.84	2.75
34-34.9	3.17	2.91	2.77	2.89	2.85	3.23	3.18	2.86	2.79
35-35.9	3.22	2.94	2.80	2.91	2.89	3.25	3.20	2.88	2.83
36-36.9	3.27	2.97	2.83	2.93	2.93	3.27	3.22	2.90	2.87
37-37.9	3.31	2.99	2.86	2.95	2.95	3.29	3.24	2.92	2.89
38-38.9	....	3.01	2.89	2.97	2.97	3.31	3.26	2.94	2.91
39-39.9	....	3.03	2.92	2.99	2.99	3.33	3.28	2.96	2.93
40-44.9	....	3.05	2.95	3.01	3.01	3.35	3.30	2.98	2.95

*Cooke, Grayson, Montague.

Flat Prices

Louisiana:	
Sweet Lake	$3.00
Texas:	
East Texas	3.05-3.25
Conroe	3.23-3.53
Van	3.08
Pennsylvania Grade:	
Bradford	$4.75-4.80
Middle District	4.52
Southwest Pennsylvania	4.25
West Virginia	4.17
Buckeye Grade	4.08
Illinois Basin	**3.00-3.05**

Foreign

Middle East, Persian Gulf: (cargoes f.o.b. lifting port)	
Arabian, 34.0°-34.9°, Ras Tanura	$1.80
Iranian, 34.0°-34.9°, Bandar Mashur	1.78
Iranian, 34.0°-34.9°, Abadan	1.73
Iraq, 35.0°-35.9°, Fao	1.72
Kuwait, 31.0°-31.9°, Mina-al-Ahmadi	1.59
Qatar, 41.0°-41.9°, Umm Said	1.95
Middle East, E. Mediterranean:	
Arabian, 34.0°-34.9°, Sidon	$2.17
Iraq, Mosul-Kirkuk, 35.0°-35.9°, Tripoli	2.19
Far East (cargoes, f.o.b. Lutong, Sarawak):	
Seria Light, 36°	2.42
Canada:	
Leduc-Woodbend	$2.53
Redwater (Alta.)	2.42
Weyburn (light)	2.06
Midale C	1.70
Venezuela:	
Cumbarebo, 47°-47.9°, Tucupido	3.34
San Joaquin, 40°-40.9°, Puerto La Cruz	3.08
Oficina, 35°-35.9°, Puerto La Cruz	2.80
Tia Juana medium, 26°-26.9°, Amuay*	2.30
Quiriquire, 16.0-16.4°, Caripito	2.10
Lagunillas heavy, flat, Las Piedras*	2.10
Bachaquero, flat, 15°-16°, Las Piedras*	1.88

Prices for all crudes of 24° or lighter vary 2 cents per degree change, up or down. All crudes heavier than 24° vary 2.5 cents per half-degree gravity change.

*Also available at La Salina at 3 cents per barrel less.

Tanker Rates (Long Ton)

(Latest reported spot fixtures)

★ Gulf-NY, clean (ATRS+60%)	$4.56
★ Gulf-NY, dirty (ATRS+27.5%)	3.63
★ Carib.-NY, dirty (ATRS−60%)	1.10
PG-UK, dirty (Scale−52.5%) (29s. 0d.)	4.06
★ PG-NY, dirty (Scale−65%) (27s. 8d.)	3.87

★Denotes change from previous week.

Refined-Product Prices

Following quotations are realistic spot prices for refined products moving interstate on Wednesday each week. They may differ from refiners' posted prices and should not be considered as postings.

Light-product prices are in cents per gallon. Residual and crude prices are dollars per barrel. Crude prices are at the well unless otherwise listed.

Gasoline*

Mid-Continent (Group 3):	
★ Regular (91 octane)	12.00-12.25
★ Premium (99 octane)	14.75-15.00
Natural gasoline (26-70)	4.5
Breckenridge	4.0
Gulf Coast (cargoes for coastwise or export movements):	
Regular (90 octane)	11.00
Regular (92 octane)	11.25
Premium (98 octane)	12.25
California (rack) Los Angeles:	
Regular (90 octane)	11.30
Premium (95 octane)	12.30
Premium (100 octane)	13.80
Caribbean area (cargoes):	
Regular (87 octane)	9.50
Premium (97 octane)	11.625

*Quotations are for octanes shown. Prices usually vary with octane ratings within the regular, premium, and aviation grades.

Kerosine and Distillate

Mid-Continent (Group 3):	
★ Kerosine 42-44	10.625-10.75
★ Diesel oil (58 d.i. and above)	10.25
★ Distillate No. 1	10.25
★ Distillate No. 2	9.25
Gulf Coast (cargoes):	
Kerosine 41-43	10.25
Distillate No. 2	9.50
New York Harbor (barges):	
Kerosine 42-43	11.90
Distillate No. 2	10.90
Diesel fuel, 48-52 d.i.	11.05
Caribbean area (cargoes):	
Distillate No. 2	8.625

Residual Fuel (Bbl.)

Mid-Continent (Group 3):	
Residual fuel (max 1% S)	$1.90
Gulf Coast (cargoes):	
Bunker C fuel	2.30
New York Harbor (barges):	
Bunker C fuel	2.52
Caribbean (cargoes):	
Bunker C	2.00- 2.10
California (rack):	
Bunker C fuel, Los Angeles	2.25

Discovery Wells

(Continued from page 164)

OKLAHOMA

Kingfisher County:

Harper Oil Co. 1 Anderson, C NE SW 31-19n-5w. IPF 160 BOPD, Oswego 6,115-32 ft. TD 6,685 ft. New oil discovery.

Latimer County:

Ambassador Oil Corp. 1 W. M. Williams unit, C NW¼ 23-5n-18e. IPF 8,300 M.c.f.d., Spiro sand 8,811-31 ft. TD 9,704 ft. New gas discovery in Arkoma basin.

McClain County:

Superior Oil Co. 1 Berndt, C SE SW 6-7n-2w. IPF 292 BOPD, 40° and 37.2°, First Bromide sand 8,432-46 ft., Basal Oil Creek sand 9,230-36, 9,242-50 ft. TD 9,302 ft. Triple completion.

Pottawatomie County:

Fain-Porter Drilling Corp. 1 Elbert Neal, E½ SE SE 15-6n-2e. IPF 744 BOPD, 38°, upper Viola Ordovician 5,004-12, 5,022-32 ft., lower Viola 5,126-36 ft. Dual completion. TD 5,412 ft.

Woods County:

Myer & Dew 1 Losbough, NE NE SW 7-26n-16w. IPF 4,900 M.c.f.d., Tonkawa 4,876-86 ft. TD 5,874 ft. New gas discovery.

GULF COAST TEXAS

Live Oak County:

Morris Cannan 1 Josephine West McClelland, Lot 61 Kittie Block, Michael Garonick Sur., 135, 2 miles southwest of Oakville. AOR 3,800 M.c.f.d., dry gas, shut-in pressure 725 psi., perf. 1,878-83 ft., Hockley. TD 2,670 ft. New-pay discovery in Oakville area.

Matagorda County:

Superior Oil Co. 1-C J. E. Dawdy, Jr., Lot 146, Cartes Canal Co. Subd., Bowman & Reese Sur., A-8, 2 miles northeast of Buckeye. IP 1,260 M.c.f.d., 13.9 BOPD, 8/64-in., 43°, TP 2,940 psi., perf. 9,878-84 ft., Frio. TD 10,978 ft. New pay in West Lucky field.

Skelly Oil Co. 1-D Cobb, I&GN Sur., A-22, 6 miles north of Bay City. AOF 60 M.M.c.f.d., GLR 59 M.c.f. per bbl., 54.6°, shut-in pressure 2,941 psi., perf. 8,328-34 ft., Frio; and 71 M.M.c.f.d., GLR 64 M.c.f. per bbl., 55.1°, shut-in pressure 2,882 psi., perf. 8,253-59 ft., Frio. TD 8,527 ft. New pays in Bay City field.

Lloyd H. Smith, Michael Judd, and United Producing Co., Inc., 1 Dunn et al., Lot 10, Pybus Ranch Subd., D. T. Bruce Sur., A-432, 4 miles southeast of Blessing. IP 174 BOPD, perf. 8,802-10 ft., Frio; and 1,500 M.c.f.d., 38 BOPD, TP 2,500 psi., perf. 8,604-21 ft., Frio. TD 11,096 ft. New pays in Ashby field.

NORTH TEXAS

Wise County:

Christie, Mitchell & Mitchell 2 Daisey Taylor, 3 miles southeast of Park Springs in Blk. 10, Falls CSL Sur., A-293. IPAOF 1,050 M.c.f.d., SITP 1,119 psi., GLR 131,000:1, 57.8°, Strawn 4,656-64 ft. TD 6,015 ft. Gas-condensate discovery.

WEST CENTRAL TEXAS

Brown County:

L. B. Wood 1 O. A. Welch, 3 miles northwest of Bangs in Sec. 29, HT&B Sur. IPP 21 BOPD, plus 68% water, 38.3°, 1,152-60 ft. TD 1,274 ft. New oil discovery.

Coleman County:

Fletcher Oil & Gas Drilling Corp. 1-A Bennie Smith, ¾ mile north of Old Goldsboro field, 1 mile north of Goldsboro in Subd. 100, L. S. Burford Sur. IPCAOF 12,400 M.c.f.d., Gray sand 3,972-75 ft. TD 4,005 ft. New gas discovery from OWWO.

Laverne Oil Acct. & Hunter Woodruff 1 Hayden Hargett, 5 miles southwest of Coleman in M. Searey Sur. 32. IPF 71 BOPD, 20/64-in. choke, 46°, GOR 1,100:1, CP 450 psi., TP 125 psi. Strawn 2,873-91 ft. TD 2,940 ft. New oil discovery.

B. C. McMordie 1 Ludie Owen, 4½ miles northwest of Webb in H. McNeil Sur. 284. IPCAOF 8 M.M.c.f.d., plus 7½ BDPMPD, TP 895 psi., Cross Cut sand 2,052-54 ft. TD 2,875 ft. Gas-condensate discovery.

Jones County:

Dugger & Herring et al. 1 Louis Herring, 10 miles north of Merkel in Subd. 7, Godwin Subd., G. A. Kirkland Sur. IPF 80 BOPD, 12/64-in. choke, 40.1°, GOR 730:1, CP 175 psi., TP 80 psi. Swastika sand 3,090-96 ft. TD 3,122 ft. New oil discovery.

Palo Pinto County:

M&W Operators 1 Charlsie Orno, 1½ miles north of Brad in Sec. 16, Blk. 3, T&P Sur., A-1143. IPCAOF 6,400 M.c.f.d., Conglomerate 4,006-14 ft. TD 4,500 ft. Shut in gas discovery.

Prorated in Regular field:

Ralston Oil Co. 1 Vernon Bragg, OWPB, 5 miles northwest of Glencove in B. F. Adams Sur. 321. IPF 69 BOPD, plus 2% water, 12/64-in. choke, 41°, GOR 700:1, CP 240 psi., TP 230 psi. Dog Bend sand 3,404-8 ft. TD 3,995 ft. PBTD 3,410 ft. New oil discovery.

Shackelford County:

The Four "J" Cattle Co. 1 Walker Estate, 7 miles northeast of Albany in Sec. 383, TE&L Sur. IPF 404 BOPD, 16/64-in. choke, Caddo 3,960-70 ft., 41°, GOR 574:1, CP 150 psi., TP 450 psi. IPF 501 BOPD, 16/64-in. choke, Miss. 4,540-84 ft. 42°, GOR 1,806:1, packer, TP 1,125 psi. Completed in Gem Northeast Mississippian field. TD 4,700 ft. Dual oil discovery.

Taylor County:

Copaz Oil & Gas Corp. 1 J. K. Polk, 3 miles west of Buffalo Gap in Sec. 5, Blk. 2, T&NO Sur. IPCAOF 4,400 M.c.f.d., Fry sand 4,883-99 ft. TD 5,171 ft. New gas discovery.

Fletcher 1 Mildred Spill Gardner, ¾ mile north of Bradshaw in George Wheelock Sur. 343 IPF 113 BOPD, 12/64-in. choke, 42°, GOR 650:1, CP 220 psi., TP 120 psi. Gardner sand 4,501-4 ft. TD 4,650 ft. New oil discovery.

Prorated in Regular field. W. M. L. Rodgers 1 Frank W. Brown, 8 miles west of Bradshaw in Sec. 115, Blk. 64, H&TC Sur. IPP 42 BOPD, 41°, GOR 650:1, Fry sand 4,472½-75½ ft. TD 4,509 ft. New oil discovery.

Throckmorton County:

Currey Oil Co. 1 Ella Ingram, 4 miles southwest of Throckmorton in SW¼ Sec. 249, BBB&C Sur. IPF 130 BOPD, 14/64-in. choke, 40°, GOR 500:1, packer, TP 450 psi. Caddo lime 4,467-69 ft. TD 5,072 ft. New oil discovery.

WEST TEXAS

Andrews County:

Texaco Inc. 9-CB State of Texas, 7 miles northeast of Andrews in Sec. 32, Blk. 4, Univ. Lands Survey. IPF 375 BOPD, 15/64-in. choke, 45.6°, GOR 513:1, TP 550 psi., packer.

Ellenburger 13,898-13,900 ft. TD 13,961 ft., PBTD 13,930 ft. New oil discovery.

Crockett County:

Eason & Hancock 1 University Lands 46, 24 miles southeast of Big Lake in Sec. 12, Blk. 46, Univ. Lands Sur. IPP 26 BOPD, 34°, Permian 1,646-88 ft. TD 1,748 ft. PBTD 1,705 ft.

Fisher County:

TXL Oil Corp. 1-A Fisher Fee, 6 miles northeast of Orton, Sec. 21, Blk. V, T&P Sur. 6 miles northeast of Ocho Juan Reef field. IPF 116 BOPD, 12/64-in. choke, 42°, GOR 635:1. TP 150 psi. Noodle Creek 3,707-15 ft. TD 6,765 ft. PB 3,800 ft. New oil discovery.

Gaines County:

J. C. Williamson 1 Thornhill, 4 miles west of Seagraves in Sec. 3, Blk. C-35, PSL Sur. IPP 23 BOPD, plus 60% water, 32°, San Andres 5,680-5,700 ft. TD 5,718 ft. New oil discovery.

Martin County:

Texas National Petroleum Co. 1 Jim Tom, 1½ miles southeast of Stanton in Sec. 30, Blk. 35, T-1-S, T&P Sur. IPF 186 BOPD, 16/64-in. choke, 42°, GOR 768:1, TP 450 psi., packer. TD 10,212 ft. PBTD 9,365 ft. New oil discovery.

Runnels County:

Roy Guffey Oil Co. 1 Ira McNeil, 8 miles west of Winters in H. T. Sapp Sur., 2 miles west of North Winters field. IPP 124 BOPD, 39°, GOR 516:1, lower Fry sand 4,527-32 ft. TD 4,915 ft. New oil discovery.

Scurry County:

Texaco Inc. 249 P. L. Fuller NCT-1, 16 miles northeast of Snyder in Sec. 617, Blk. 97, H&TC Sur. IPP 137 BOPD, 37.1°, 1½ miles East of Fuller field, 1½ miles southwest of Cogdell field. GOR 230:1. TD 7,796 ft. Strawn pay 7,290-7,300 and 7,316-26 ft.

Ward County:

Gulf Oil Corp. 505 Hutchings Stock Association, 2¾ miles south of Monahans in Sec. 54, Blk. N. G&MMB&A Sur. IPCAOF 14,300 M.c.f.d., 7,388-7,408 ft. TD 7,535 ft. New gas discovery.

Gulf Oil Corp. 515 Hutchings Stock Association, 4½ miles southwest of Monahans in Sec. 74, Blk. N, G&MMB&A Sur. IPF 204 BOPD, 8/64-in. choke, 37.2°, GOR 1167.1, TP 1,120 psi., CP 220 psi. TD 8,545 ft. Penn. 8,088-8,132 ft. New oil discovery.

Liedtke '60 Ltd. 1 Monroe, 9 miles west of Pyote in Sec. 148, Blk. 34, H&TC Sur. IPP 55 BOPD, 60% water, 35°, GOR 1,345:1. Delaware 5,091 ft. TD 5,132 ft. New oil discovery.

UTAH

San Juan County:

Anido Creek discovery. Champlin Oil & Refining Co.-Murphy Corp. 1 Navajo-111, C NE NE 13-43s-24e. IPF 2085 BOPD, 1-in. choke, 42.7°, TP 225 psi., CP 330 psi., GOR 870:1. Ismay 5,304-46 ft. Ismay discovery, new field. TD 6,610 ft. PBTD 6,060 ft.

Pure Oil Co. 2 NW Lisbon-C, NE NW 3-30s-24e. IPF 103 BOPD, 129 M.c.f.d., no water, in 24 hours, 16/64-in. choke, GOR 1,252:1, 46.5°, TP 100 psi. Paradox salt open hole 5,934-6,088 ft. TD 10,706 ft., PBTD 7,714 ft. Paradox salt discovery, new pool.

WYOMING

Sweetwater County, Black Butte Creek unit:

Caulkins Oil Co. 42-18 unit, SE NE 18-19n-102w. IPF 1,913 M.c.f.d., ½-in. choke, TP 336 psi., Morrison 4,668-74 ft. TD 5,020 ft. Morrison discovery, new field.

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Tulsa, Oklahoma

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Box M-285

The Oil and Gas Journal

Tulsa, Oklahoma

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DRILLING OR petroleum engineer: 11 years varied domestic and foreign experience in engineering, as a toolpusher, and supervisor. Two degrees in engineering. Speak fluent Spanish. Desire domestic or foreign employment. Box M-296, The Oil and Gas Journal, Tulsa, Oklahoma.

BS PETROLEUM Engineering, 11 years experience production engineering and supervision. Desire to change to petroleum sales. Box M-295, The Oil and Gas Journal, Tulsa, Oklahoma.

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LEGAL

U. S. DEPARTMENT OF THE INTERIOR, Bureau of Land Management, Land Office, Cheyenne, Wyoming. This has reference to offer of lands for oil and gas leasing published in this journal on January 16 and 23, 1961. The offer is hereby withdrawn, since it is held that the rental or minimum royalty rate provided in the offer is not authorized. A new offering of the lands will be announced in the near future. Arvin H. Olswold, Chief, Minerals Section.

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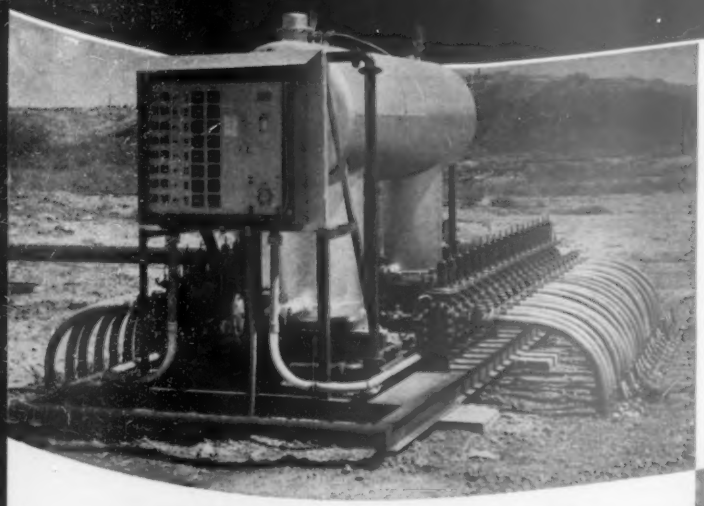
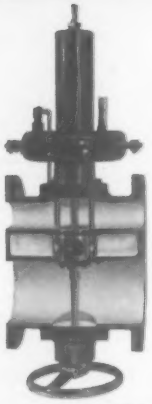
NATIONAL®

Packaged Well Test Unit

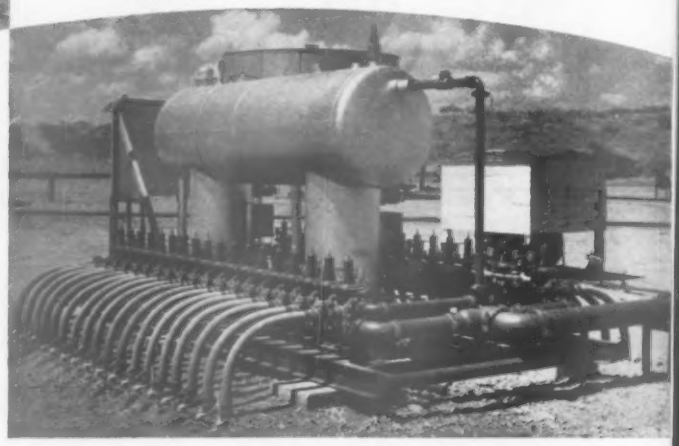
"Tests Better Automatically"





National MANI-FLO® Valves make this compact unit possible. MANI-FLO Valves require no lubrication and no expensive well-headers. When bolted together, MANI-FLOS are their own well-header and test line . . . self-contained . . . — Unique!

PATENT APPLIED FOR



AUTOMATICALLY DIVERTS FLUID STREAMS FROM WELLS, THEN SEPARATES, MEASURES, AND RECORDS QUANTITIES

- Automatically programs each of **36** wells in sequence for scheduled test.
- Separates oil, gas, and water.
- Measures the oil and water in the National Type B Liqua-Meters located in the legs of the National O-G-W MONOTUBE® SEPARATOR.
- Accumulates the volume of each product on the reset counters on the control panel.
- Strip Chart Recorder records production in relation to time.
- Separated products commingled and returned to the production line after test.
- Electric control panel actuates the pneumatic operated MANI-FLO valves to place well on test or production.
- Pictured unit does not measure or record gas production, but facility may be added at nominal cost on the same skid.
- Any power failure diverts all valves to production.
- Wells may be shut in manually with handwheel on bottom of MANI-FLO valve.

CONTROL PANEL

Weatherproofed and rain shielded. Clear plastic window allows complete visibility of all counters, well selector switches, and Strip Chart Recorder. Light indicates well on test.

STRIP CHART Recorder indicates:

Best production hours.
If well is flowing and/or surging.
Proper operation of pumping well.
Accurate well performance.

A Plus Value With All National Products . . . Engineers and field crews living in your area with stocked warehouses, complete units or parts ready to size, install and service National Well Test Units!

It's a National®

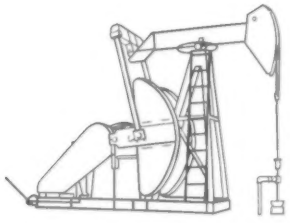
NATIONAL TANK COMPANY

DRAWER 1710

TULSA, OKLAHOMA

SERVICE LIKE *NOW!*

When you buy a Cabot Pumping Unit you buy more than the unit itself. You're buying *fast, courteous service* for that unit day or night . . . 365 days a year! Cabot maintains convenient service centers throughout the oil country, each having a complete stock of Cabot Pumping Unit parts and staff of factory trained personnel. If you are not now using Cabot units . . . make your next one a Cabot! You'll prove to yourself that *Cabot Quality* plus *Cabot Service* adds up to the tops in dependable pumping.



CALL YOUR J&L MAN...

OIL FIELD PUMPING EQUIPMENT
CABOT
PAMPA, TEXAS
FRANKS

CABOT CORPORATION
MACHINERY DIVISION

Why you should specify

AMERICAN IRON TOOL JOINTS

Flash Welded
Straight Grip®

on your next string of drill pipe!

1 QUALITY CONTROL begins at the steel mill with the specification of PREMIUM STEEL! Metallurgical technicians at AMERICAN IRON research labs constantly check the steel to be sure it complies with our high standards and rigid specifications.

2 MANUFACTURING CONTROL is constant through the use of the most modern techniques and machines available. This guarantees YOU that *all* AMERICAN IRON TOOL JOINTS have the *same* physical properties!

3 INSPECTION CONTROL with the use of such technical equipment as the REFLECTOSCOPE, the MAGNUFLUX and TEDAR machines. This equipment, plus others developed through research, assures longer life of your AMERICAN IRON TOOL JOINTS . . . a real economy in today's competitive market.

Use OPEN-HOLE Tool Joints for your Lightweight Drill Pipe!

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MANUFACTURERS OF OIL FIELD EQUIPMENT
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518 N. Indiana Ave.
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Another AMF Product
PETROLEUM EQUIPMENT

Specify
AMERICAN IRON TOOL JOINTS
on your next string of drill pipe
for real, economical **DRILL-A-BILITY!**